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FINAL
ENVIRONMENTAL STATEMENT

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GRANITE REEF AQUEDUCT TRANSMISSION SYSTEM

◆

A FEATURE OF THE CENTRAL ARIZONA PROJECT

Prepared by
DEPARTMENT OF THE INTERIOR
Bureau of Reclamation

Lower Colorado Region

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DEPARTMENT OF THE INTERIOR

FINAL
ENVIRONMENTAL STATEMENT

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GRANITE REEF AQUEDUCT
TRANSMISSION SYSTEM
CENTRAL ARIZONA PROJECT
ARIZONA-NEW MEXICO

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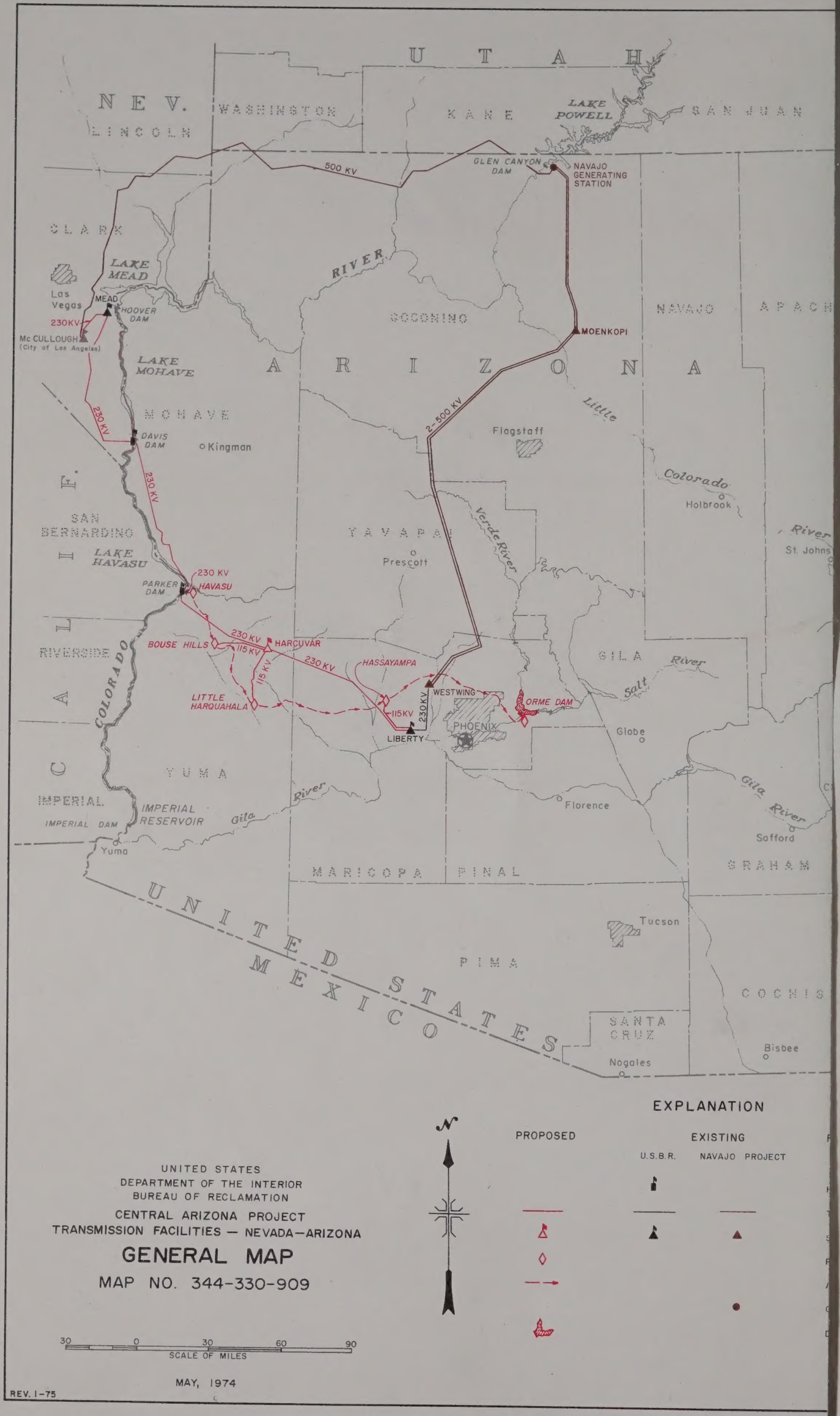
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N E V.
WASHINGTON
KANE
SAN JUAN
LINCOLN
LAKE POWELL
500 KV
GLEN CANYON DAM
NAVAJO GENERATING STATION
CLARK
LAKE MEAD
RIVER
Las Vegas
MEAD
HOOVER DAM
230KV
Mc CULLOUGH (City of Los Angeles)
COCONINO
NAVAJO
APACH
MOENKOPI
LAKE MOHAVE
A R I Z O N A
2-500 KV
Little
230 KV
MOHAVE
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Kingman
Flagstaff
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Colorado
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YAVAPAI
Verde River
River
St. Johns
LAKE HAVASU
Prescott
230 KV
PARKER DAM
HAVASU
GILA
River
RIVERSIDE
BOUSE HILLS
230 KV
115 KV
HARCUVAR
230 KV
HASSAYAMPA
115 KV
Salt
COLORADO
LITTLE HARQUAHALA
WESTWING
ORME DAM
115KV
230 KV
PHOENIX
Globe
LIBERTY
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Gila River
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PROPOSED
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U.S.B.R.
NAVAJO PROJECT
N
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES — NEVADA—ARIZONA
GENERAL MAP
MAP NO. 344-330-909
30 0 30 60 90
SCALE OF MILES
MAY, 1974
REV. 1-75

Figure 1

SUMMARY

( ) Draft (X) Final Environmental Statement

Department of the Interior, Bureau of Reclamation, Lower Colorado Region

1. Type of action:

   (X) Administrative ( ) Legislative

2. Brief description of action:

   This statement describes the environmental impact associated with constructing an electric power transmission system to supply power to pumping plants and check structures along the Granite Reef Aqueduct. The main backbone transmission line will connect McCullough switching station in Clark County, Nevada with Liberty Substation in Maricopa County, Arizona. The line will also interconnect Mead Substation, Davis Switchyard, and Parker Switchyard. In addition, a new substation, called Harcuvar, will be constructed in Yuma County, Arizona. Approximately 275 miles of backbone 230-kV transmission line will be constructed. Also, 77 miles of radial transmission line, at 230-kV and 115-kV, of which 19 miles are double circuited to the backbone Parker-Liberty line, will be constructed to service Havasu, Bouse Hills, Little Harquahala and Hassayampa Pumping Plants along the Granite Reef Aqueduct. Construction activities will be staged and occur over a 10-year duration.

3. Summary of environmental impacts and adverse environmental effects:

   The principal impact of construction of the transmission line will be esthetic in nature. About 333 miles of new transmission line will be constructed most of which will parallel existing lines.

   A long-term average of 1,675 GWH/yr. will be required for the pumping load of the Granite Reef Aqueduct.

   Construction activities will have a temporary effect on the biota of the area. Certain temporary localized effects of increased noise and blowing dust as normally encountered with construction will be experienced.

   Acquisition of approximately 4,116 acres of land will be required for the transmission system right-of-way which will restrict development and future land use by man. Of this amount, 14 acres will be permanently occupied by structures which will preclude wildlife use.

   Approximately 70 miles of new access roads will be constructed which may increase off-road vehicle use and result in disturbances of the desert biotic and vegetal communities.

4. Alternatives considered:

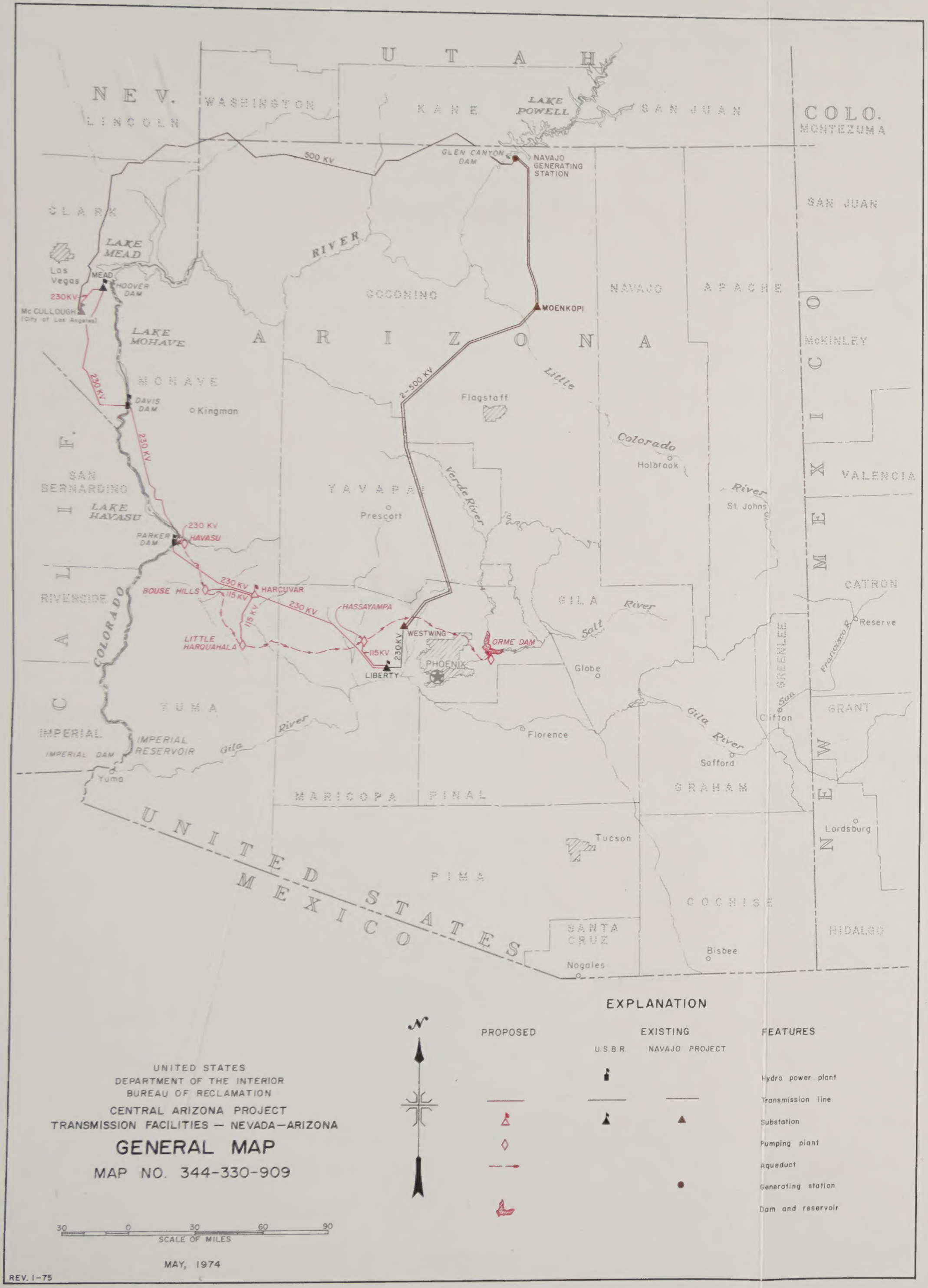
   a. Transmission systems alternatives
   b. Routing and location alternatives
   c. Alternatives in design
   d. No action

5. List of entities from which comments have been requested:

   See attached list.

6. Date draft statement made available to CEQ and the public: November 14, 1974

7. Date final statement made available to CEQ and the public: AUG 4 1975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WASHINGTON
KANE
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COLO.
MONTEZUMA
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NAVAJO GENERATING STATION
CLARK
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LAKE MEAD
RIVER
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MEAD
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NAVAJO
APACHE
LAKE MOHAVE
ARIZONA
McKINLEY
MOHAVE
230 KV
2-500 KV
Little
DAVIS DAM
Kingman
Flagstaff
CALIF.
SAN BERNARDINO
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Holbrook
YAVAPAI
Verde River
River
VALENCIA
LAKE HAVASU
Prescott
St. Johns
PARKER DAM
230 KV
HAVASU
NEW MEXICO
230 KV
HARCUVAR
BOUSE HILLS
115 KV
RIVERSIDE
CATRON
230 KV
HASSAYAMPA
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Salt
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115KV
230 KV
PHOENIX
LIBERTY
GREENLEE
Francisco R.
Globe
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San
YUMA
Clifton
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IMPERIAL
IMPERIAL RESERVOIR
River
Gila
Florence
Gila
River
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Hydro power plant
Transmission line
Substation
Pumping plant
Aqueduct
Generating station
Dam and reservoir

Figure 1

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GRANITE REEF AQUEDUCT TRANSMISSION SYSTEM

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* Arizona Atomic Energy Commission, Phoenix, Arizona
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* Nevada State Park System, Reno, Nevada
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California Department of Fish and Game, Sacramento, California
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* The Resources Agency of California, Sacramento, California
* Division of Colorado River Resources (formerly Colorado River Commission of Nevada)
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Nevada Department of Fish and Game, Las Vegas, Nevada
Nevada Department of Fish and Game, Reno, Nevada
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City of Boulder City, Nevada
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* Maricopa County Flood Control District, Phoenix, Arizona
Maricopa Association of Governments, Phoenix, Arizona
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Yuma County Chamber of Commerce, Yuma, Arizona
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CHAPTER I

DESCRIPTION OF THE PROPOSAL

I. DESCRIPTION OF THE PROPOSAL

A. Introduction [1, 2, 3, 29]

This environmental statement describes the facilities, environment along and adjacent to the facilities, the impacts and effects upon the environment, mitigation considerations and alternatives considered in developing a transmission system to provide for the power requirements of the Granite Reef Aqueduct. The construction of the transmission system would integrate with the existing Federal facilities between McCullough Switching Station near Boulder City, Nevada, and the Liberty Substation near Phoenix, Arizona. Figures 1 and 2 show the relationship of the proposed transmission system to the area, the other planned facilities of the Central Arizona Project and to the existing Federal transmission lines in the area.

This environmental statement on the transmission system serving the Granite Reef Aqueduct (Granite Reef Division) of the Central Arizona Project (CAP) is submitted in compliance with the National Environmental Policy Act of 1969 (83 Stat. 852, 42 U.S.C. 4321, et seq.), the Council on Environmental Quality Guidelines (38 F.R. 20550, August 1, 1973), Department of the Interior regulations (36 F.R. 19343, October 2, 1971), and Bureau of Reclamation directives (37 F.R. 24910, November 23, 1972). It is also submitted in accordance with policy set forth in the overall environmental statement on the CAP (FES 72-35) which provided for preparation of individual environmental statements for major features of the CAP prior to initiation of construction on the separate components. Future additional environmental statements on other features of the CAP will include the transmission facilities applicable to those features.

This statement supplements the general information for the power and transmission requirements of the Granite Reef Aqueduct system as covered in the above-referenced final overall environmental statement for the CAP (FES 72-35), filed with the Council on Environmental Quality (CEQ) on September 26, 1972. A final environmental statement for the Havasu Intake Channel, Havasu Pumping Plant, and Buckskin Mountains Tunnel (FES 73-2) was filed with CEQ on January 15, 1973, and the final environmental statement for the Granite Reef Aqueduct (FES 74-5) was filed with CEQ on January 22, 1974.

The source of power for the electrical facilities of the Granite Reef Aqueduct will be from the Navajo Generating Station located near Page, Arizona. The Navajo Generating Station and attendant transmission system are described in the final environmental statement for the Navajo Project (FES 72-1), dated February 4, 1972. Power will be delivered over the Navajo Project's Southern Transmission System from the generating station south to the Navajo Project Westwing Substation located northwest of Phoenix, Arizona. From the Westwing Substation, power will be delivered to the Pacific Northwest-Pacific Southwest (PNW-PSW) Intertie Project's Liberty Substation located west of Phoenix, Arizona, over the Intertie's existing Pinnacle Peak-Liberty 230-kV transmission line and a short (230-kV) interconnection line (approximately 2 miles in length) that connects the Westwing Substation to the Pinnacle Peak-Liberty 230-kV transmission line. The short interconnection line will be completed in 1975 as a part of the Intertie Project system for the purpose of delivering power to the Liberty Substation. Power will also be delivered over the Navajo Project's Western Transmission System, from the Navajo Generating Station west to the McCullough Switching Station located southwest of Boulder City, Nevada. The CAP transmission system will connect the Liberty Substation and McCullough Switching Station points of delivery to the Granite Reef Aqueduct pumping plants and interconnect with the existing Parker-Davis and PNW-PSW Intertie systems. The integration of these systems will provide a backbone system for the delivery of power to meet the demands of the Granite Reef Aqueduct and will also improve the reliability of the Federal power system.

In addition to the main 230-kV line, or backbone of the transmission system, this statement includes a description of the 230-kV and 115-kV radial transmission system to the pumping plants and distribution system to the check structures along the Granite Reef Aqueduct. The transmission system is a major component of the CAP for which this separate environmental statement is prepared.

The estimated cost of the integrated transmission system to serve the Granite Reef Aqueduct loads, based on the 1974 cost index, is $45,975,000. Proper allocation of costs to the various projects, i.e., Parker-Davis Project, CAP, served by the integrated system will be necessary. Salvage values of replaced facilities, remaining costs to be amortized, system capacity usage, and many other factors will be considered to determine the proper allocation of costs among the projects affected. About 70 percent of the CAP share of construction cost will be repaid to the Federal Treasury by the water and power users who benefit directly from the CAP. By provisions of Public Law 89-72, as amended by Public Law 93-251, dated March 7, 1974, the joint project costs and one-half of the separable construction cost for recreation and exactly three-fourths of the allocated costs for fish and wildlife enhancement purposes are nonreimbursable. Costs allocated to flood control in the National interest are also nonreimbursable.

Initial construction of the Granite Reef Aqueduct transmission system is expected to start in mid-1975 and will take approximately 10 years to complete.

In order to assist the reviewing public in interpreting several of the technical terms included in this environmental statement, an engineering glossary and environmental glossary have been put in Appendix D.

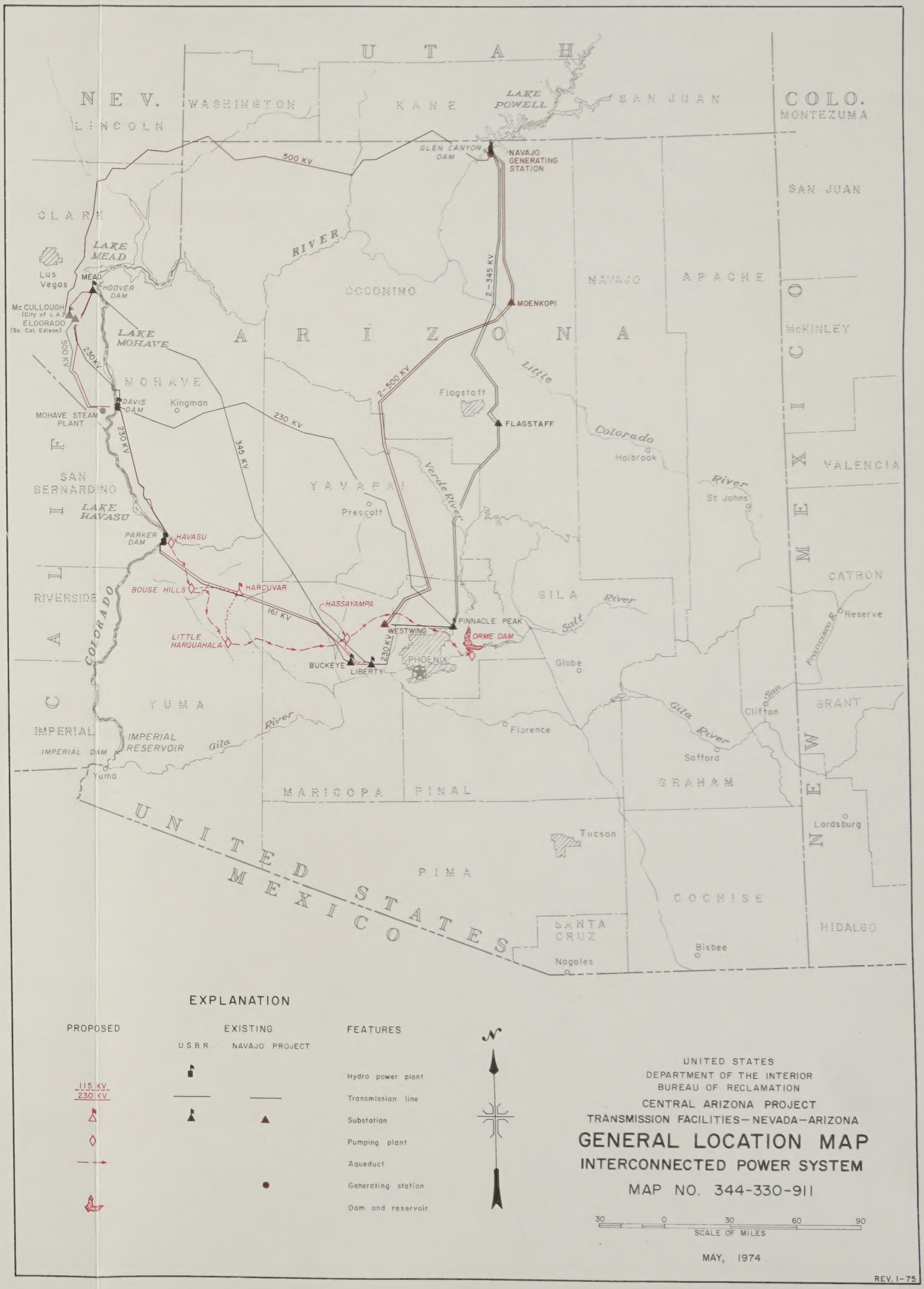

UTAH
NEV.
LINCOLN
WASHINGTON
KANE
LAKE POWELL
SAN JUAN
COLO.
MONTEZUMA
GLEN CANYON DAM
NAVAJO GENERATING STATION
500 KV
SAN JUAN
CLARK
LAKE MEAD
RIVER
Las Vegas
MEAD
HOOVER DAM
McCULLOUGH (City of L.A.)
ELDORADO (So. Cal. Edison)
COCONINO
2-345 KV
MOENKOPI
NAVAJO
APACHE
McKINLEY
LAKE MOHAVE
500 KV
230 KV
ARIZONA
MOHAVE
Little
2-500 KV
Flagstaff
DAVIS DAM
Kingman
MOHAVE STEAM PLANT
230 KV
FLAGSTAFF
Colorado
Holbrook
230 KV
345 KV
VALENCIA
SAN BERNARDINO
Verde River
River
St Johns
YAVAPAI
Prescott
LAKE HAVASU
PARKER DAM
HAVASU
NEW MEXICO
CALIF.
GILA
River
CATRON
BOUSE HILLS
HARCUVAR
RIVERSIDE
COLORADO
HASSAYAMPA
161 KV
PINNACLE PEAK
Salt
Reserve
San Francisco R.
WESTWING
ORME DAM
LITTLE HARQUAHALA
230 KV
PHOENIX
BUCKEYE
LIBERTY
Globe
YUMA
Gila River
San
Clifton
GRANT
River
Florence
IMPERIAL
IMPERIAL RESERVOIR
IMPERIAL DAM
Gila
Safford
Yuma
MARICOPA
PINAL
GRAHAM
UNITED STATES
MEXICO
Tucson
Lordsburg
PIMA
COCHISE
SANTA CRUZ
HIDALGO
Bisbee
Nogales
EXPLANATION
PROPOSED
EXISTING
U.S.B.R.
NAVAJO PROJECT
FEATURES
115 KV
230 KV
Hydro power plant
Transmission line
Substation
Pumping plant
Aqueduct
Generating station
Dam and reservoir
N
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES—NEVADA—ARIZONA
GENERAL LOCATION MAP
INTERCONNECTED POWER SYSTEM
MAP NO. 344-330-911
30
0
30
60
90
SCALE OF MILES
MAY, 1974
REV. 1-75

Figure 2

B. Legislative History, Authorization, and Requirements 14-18

1. Legislative History 4-7, 9, 10, 20-25, 35-37

At the request of the Colorado River Basin States (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming), Congress passed an act on August 19, 1921, giving consent to the States to negotiate and enter into a compact for the equitable apportionment of the water supply of the Colorado River. This agreement, known as the Colorado River Compact, was signed in Santa Fe, New Mexico, on November 24, 1922. The Compact divides the entire Colorado River Basin into two parts, the Upper Basin and the Lower Basin, separated at a point on the river in northern Arizona known as Lee Ferry. Article III(a) of the Compact apportions to the Upper Basin and to the Lower Basin in perpetuity the exclusive beneficial consumptive use of 7,500,000 acre-feet each of water per year from the Colorado River system. Article III(b) apportions an additional 1,000,000 acre-feet annually to the Lower Basin for beneficial use.

In 1928, Congress passed the Boulder Canyon Project Act authorizing construction of the Boulder Canyon Project. The Act and its subsequent amendment by the Boulder Canyon Project Adjustment Act directed the Secretary of the Interior to make investigations and publish reports of the feasibility of projects for irrigation, generation of electric power, and other purposes in the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming.

In 1944, the Bureau of Reclamation and the State of Arizona entered into a contract for the expenditure of $400,000 for a cooperative investigation of the utilization of Colorado River water in Arizona. That investigation resulted in the Central Arizona Project Report which was submitted to the Secretary of the Interior on December 19, 1947. The Secretary's findings relative to CAP were submitted to Congress in September 1948. Preliminary hearings on the CAP were actually started in 1947 in the Senate and House of Representatives in advance of submittal of the report. A favorable vote on the CAP (52-28) was obtained in the Senate, but in 1951 the House Committee on Interior and Insular Affairs postponed action until such time as Arizona's right to the use of Colorado River water was adjudicated or settled by other means.

In the summer of 1952, the State of Arizona initiated an interstate suit in the Supreme Court of the United States against California and others to confirm its entitlement to Colorado River water. On June 3, 1963, the Supreme Court rendered an opinion on Arizona's entitlement, and subsequently, on March 9, 1964, the Supreme Court decree in Arizona v. California confirmed Arizona's entitlement to 2,800,000 acre-feet annually of the first 7,500,000 acre-feet of Colorado River mainstream flow available to the three Lower Basin states plus 46 percent of flows in excess of 7,500,000 acre-feet.

On June 4, 1963, the day following the Supreme Court opinion, bills to authorize the CAP were introduced in both Houses of Congress. From 1963 through 1968, many additional bills and amendments were introduced proposing different versions of the CAP, and hearings were held yearly.

The most significant bills considered were:

a. S. 1658, introduced June 4, 1963
b. H.R. 4671, introduced February 9, 1965
c. H.R. 3300, introduced January 23, 1967
d. S. 1004, introduced February 16, 1967

Different versions of the CAP were passed by the United States Senate (S. 1004, August 7, 1967) and the House of Representatives (H.R. 3300, May 16, 1968). S. 1004 cleared a conference committee on August 1, 1968, and was approved by both House and Senate. The compromise version became Public Law 90-537 with the approval of President Johnson on September 30, 1968.

During the long legislative history of the CAP, many environmental issues were examined by various Congressional committees. Persons and groups demanding that environmental consequences of the CAP be considered presented their views to a responsive Congress. Hualapai (Bridge Canyon) and Marble Canyon Dams on the Colorado River were dropped from the CAP as a result of opposition from environmental groups. A decision was made by the Congress and the Department of the Interior that a thermal electric generating station was a feasible alternative to provide pumping energy and financial assistance to the CAP.

In consideration of environmental concerns over effects of the dams in the Grand Canyon area, the Secretary of the Interior directed the Bureau of Reclamation to reevaluate and study all possible power alternatives for the CAP. Studies led to a recommendation that the Federal Government participate with public and private power utilities in the development of a large coal-fired thermal power unit which later became known as the Navajo Generating Station. It was this revised power development program and recognition of the obligation of the Mexican Treaty of 1944 as a National responsibility which provided the final catalyst for quick Congressional approval and authorization of the CAP.

The CAP was authorized under Public Law 90-537 on September 30, 1968, as part of the Colorado River Basin Project Act. The first construction contract for the excavation of the Havasu Pumping Plant site and construction of the Havasu Intake Channel embankment has been completed and a contract for Reach 11 flood detention dikes for the Granite Reef Aqueduct was awarded in April 1974. Another contract for the construction of Buckskin Mountains Tunnel was awarded in February 1975. Additional contracts will be awarded for the construction of transmission lines, substation and switchyard additions, and a new substation.

2. Legislative Requirements [1-3, 11, 12]

Public Law 90-537, the Colorado River Basin Project Act, authorizes construction of the CAP subject to a number of specific requirements and restrictions. Generally, these conditions are imposed in order to assure that existing rights are protected and that operation of the CAP is consistent with National policies and preferred water management practices. The requirements relevant to this statement are listed below. The restrictions applicable to the water conveyance system features have been delineated in the environmental statements on the overall project (FES 72-35), the Havasu Intake Channel, Havasu Pumping Plant, and Buckskin Mountains Tunnel (FES 73-2), and the Granite Reef Aqueduct (FES 74-5).

The legislative requirements relating to power sources preclude hydroelectric production from Colorado River flows between Glen Canyon Dam and Hoover Dam by restricting the Secretary of the Interior from studying or constructing any dams on the mainstream of the Colorado River between these two dams. The law further requires that the accounting for water service to a thermal generating plant in Arizona above Lee Ferry be charged against Arizona's Upper Colorado River Basin Compact entitlement of 50,000 acre-feet annually. The law authorizes the marketing of power and energy intermittently not required for CAP pumping.

C. Purpose

The transmission system will connect the power delivery points of the Navajo Project and other segments of the Federal hydroelectric generation and transmission systems to the pumping plants and other associated power demands of the Granite Reef Aqueduct system. Interconnecting with the existing Parker-Davis and PNW-PSW Intertie Federal power systems will prevent unnecessary duplication of facilities inherent with an independent system, afford reliability for both the existing and proposed Federal transmission systems, and provide advantages for delivering or marketing any CAP energy which is not needed for project facilities during offpeak pumping periods.

D. Description of Transmission System [1-3, 8, 25, 29, 34]

1. General

Power for the Granite Reef Aqueduct pumping plants will be supplied by the Navajo Generating Station at Page, Arizona, and will be delivered to the McCullough Switching Station southwest of Boulder City, Nevada, and the Liberty Substation through the Westwing Substation, both near Phoenix, Arizona. The capacity of the existing Parker-Davis Project transmission system in the CAP area is not adequate to serve both the existing loads and the CAP electrical loads, therefore, additional transmission facilities will be required. System planning studies were made to devise a transmission plan which would best serve the joint requirements of the CAP, Parker-Davis Project and the Pacific Northwest-Pacific Southwest Intertie.

Through a process of analysis of alternative routes, a transmission system was selected that will use and interconnect to existing facilities. By interconnecting with and uprating some existing facilities, it will be possible to use some existing rights-of-way and substation sites and thereby minimize the amount of additional lands and facilities required. This is in accord with national policy as expressed in Public Law 93-153, the Trans-Alaska Pipeline Authorization Act, Sections (p) and (s), to reduce the proliferation of utility right-of-way corridors.

The proposed 230-kV transmission system additions to serve the Granite Reef Aqueduct will be as shown in Figure 2 and consist of individual segments as shown in Table 1. The radial transmission system to serve the pumping plants will consist of individual lines as shown in Table 2.

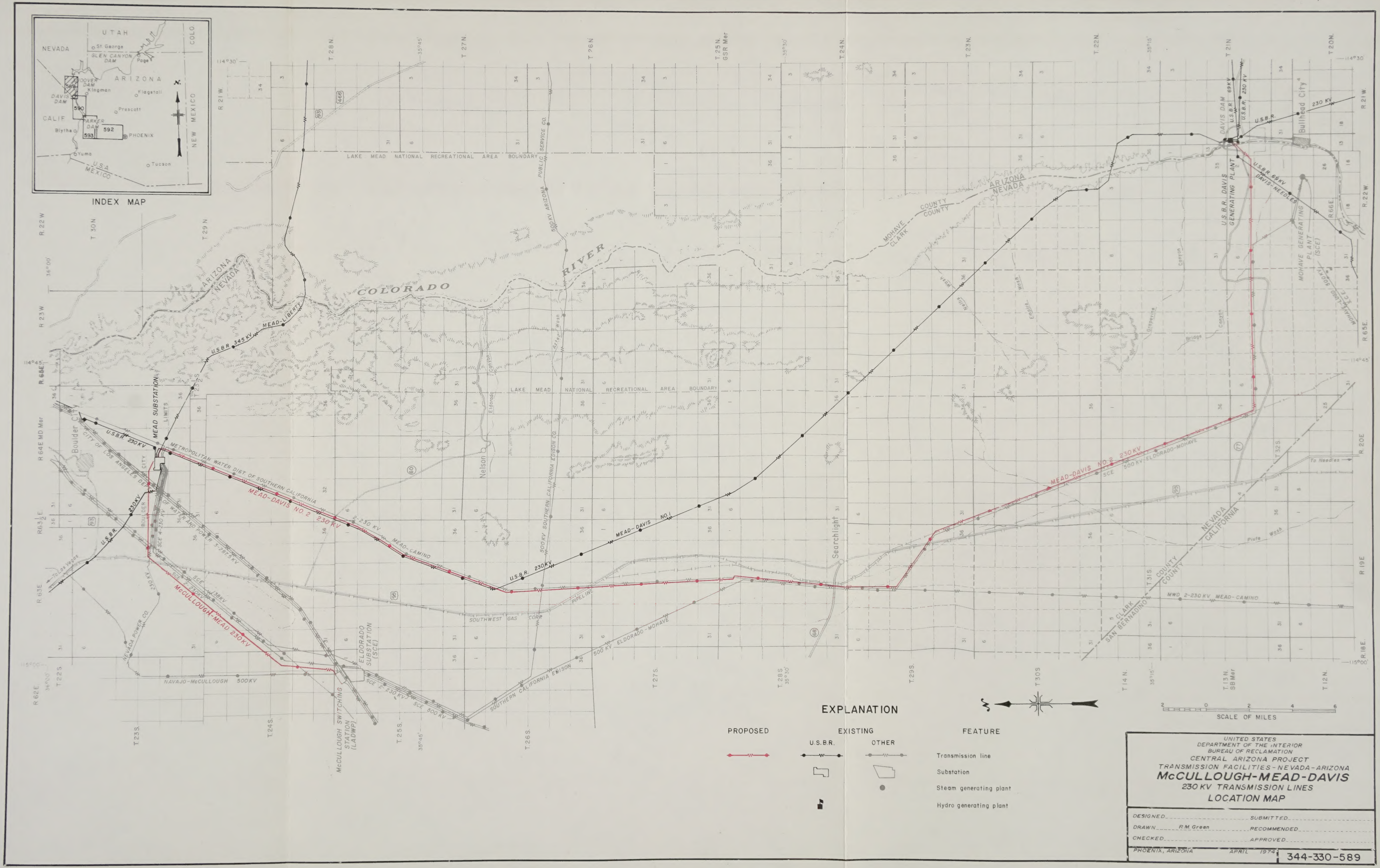
The transmission system will have a total length of 333.6 miles, of which 19 miles will be on double-circuited 230/115-kV structures making the system 352.6 circuit miles long. Of the total length, 256.5 miles of single circuit and 19.0 miles of double circuit comprise the 230-kV interconnection backbone delivery portion. The radial transmission lines consist of 58.1 miles of single circuit line and the same 19 miles of double circuit line. Of the net length (333.6 miles), 264.3 miles will parallel or replace existing lines, and approximately 69.3 miles, most of which are for radial transmission lines to the pumping plants, will require new routing. Table 5 in Section I.E.2 of this statement indicates the line length in terms of land ownership status for the different segments of the transmission system.

Additions will be constructed at existing substations and switchyards to accommodate the new system and facilitate the interconnections. A new substation called Harcuvar will be constructed for the distribution of power to the Bouse Hills and Little Harquahala Pumping Plants.

Electric power to operate the automatic gates at each of the check structures along the aqueduct will be supplied by a buried cable placed within the aqueduct right-of-way. This buried cable interconnection system was presented and discussed in the Granite Reef Aqueduct final environmental statement FES 74-5.

2. Location

The route of the 230-kV interconnecting lines, as shown on Figures 3 through 7, begins at the McCullough Switching Station southwest of Boulder City, Clark County, Nevada, moves northeast to the Mead Substation then south in Nevada through Mohave Desert terrain to the southern tip of the Lake Mead National Recreation Area. At this point, the route turns east to cross the Colorado River to the Davis Dam Switchyard in Mohave County, Arizona, and from there runs south to Parker Dam in Yuma County, Arizona. It crosses Lake Havasu upstream from the dam into San Bernardino County, California, and continues to the Parker Dam Switchyard. As the map

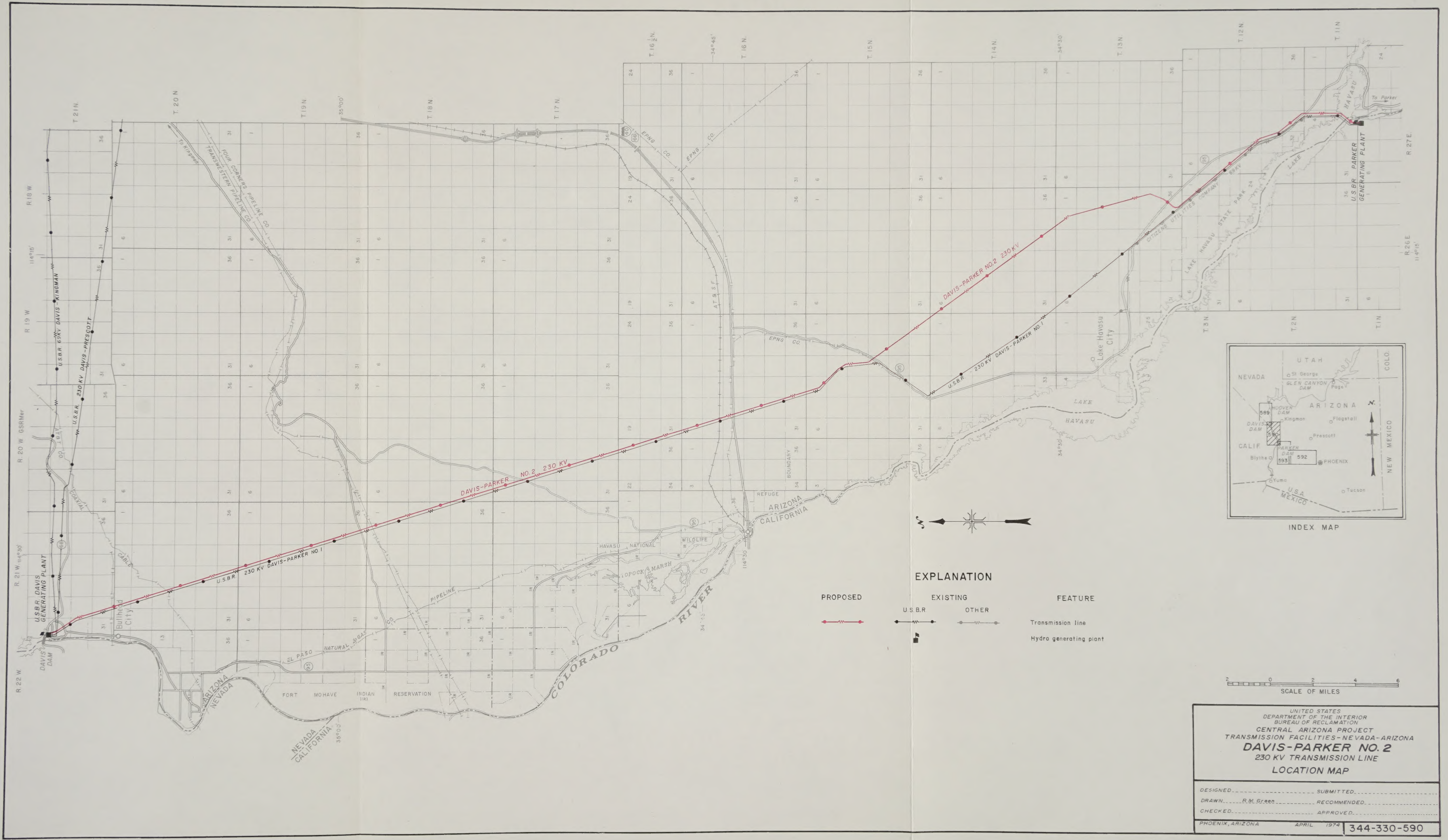


UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES - NEVADA - ARIZONA
McCULLOUGH-MEAD-DAVIS
230 KV TRANSMISSION LINES
LOCATION MAP

DESIGNED ______ SUBMITTED ______
DRAWN R.M. Green RECOMMENDED ______
CHECKED ______ APPROVED ______
PHOENIX, ARIZONA APRIL 1974 344-330-589

Interior - Reclamation, B.C., Nev. 7-74

Figure 3



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES-NEVADA-ARIZONA

DAVIS-PARKER NO. 2

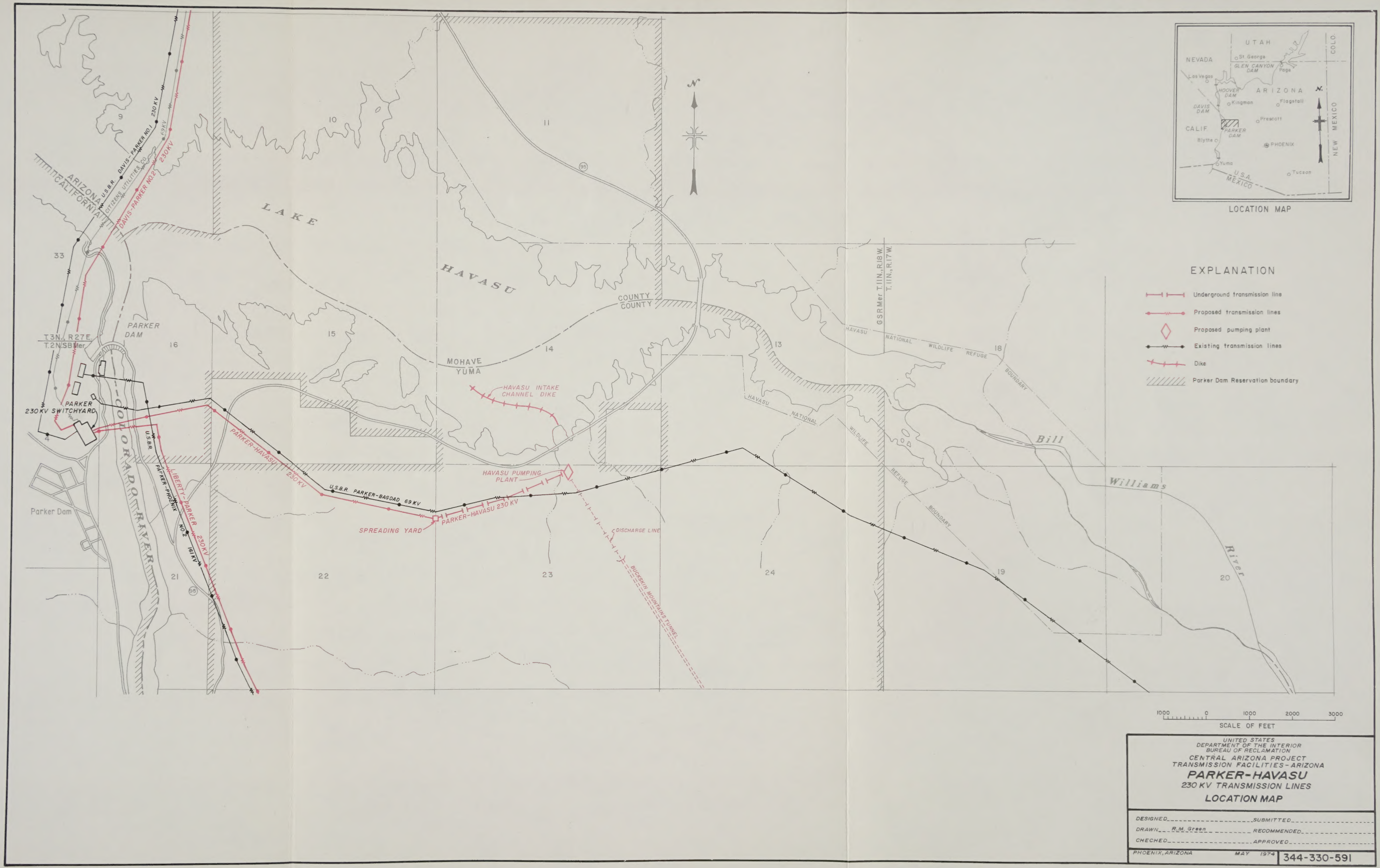
230 KV TRANSMISSION LINE

LOCATION MAP

DESIGNED........ SUBMITTED........
DRAWN R.M. Green RECOMMENDED........
CHECKED........ APPROVED........
PHOENIX, ARIZONA APRIL 1974 344-330-590

Interior - Reclamation, B.C., Nev. 7-74

Figure 4

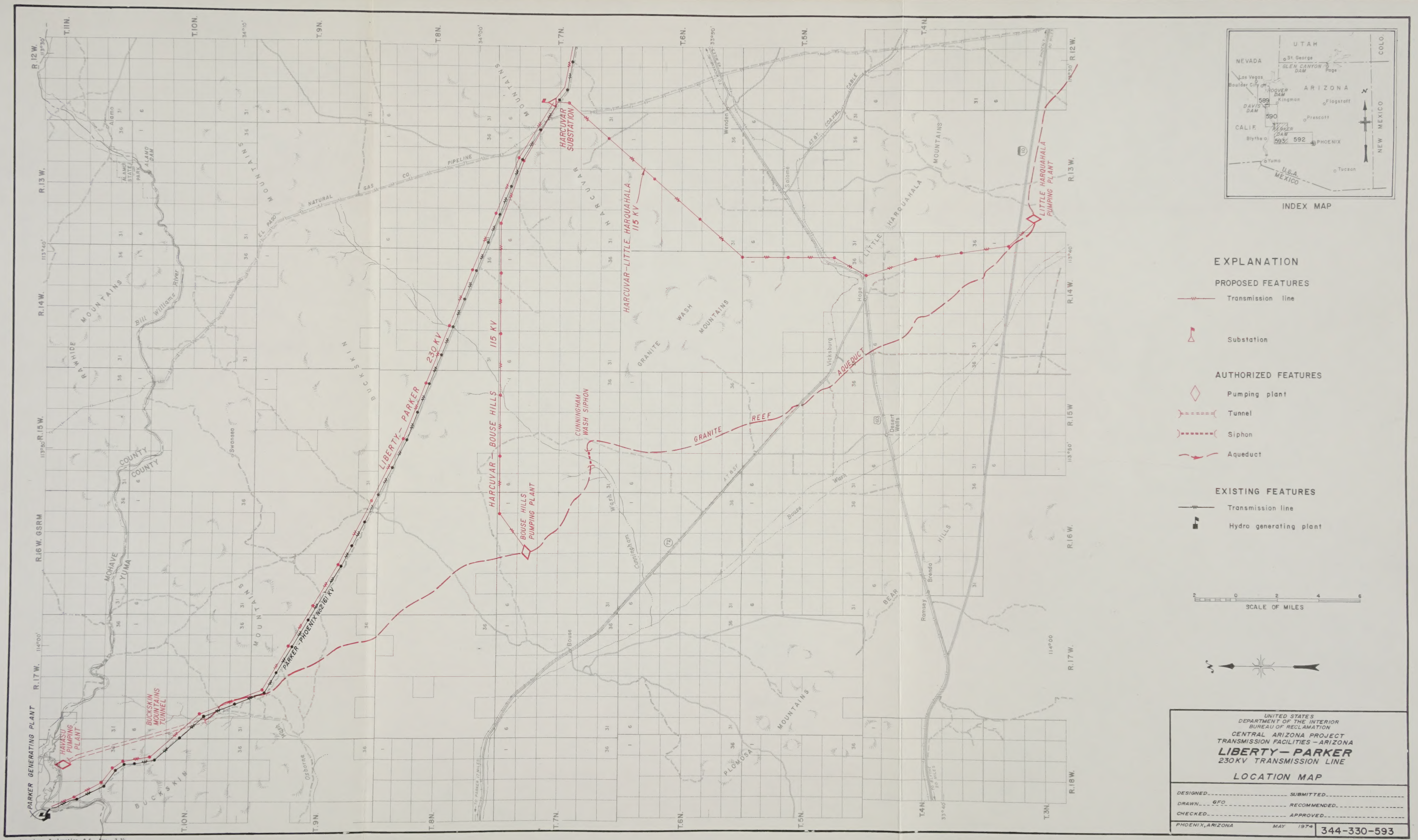


UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES – ARIZONA
PARKER–HAVASU
230 KV TRANSMISSION LINES
LOCATION MAP

DESIGNED________ SUBMITTED________
DRAWN R.M. Green RECOMMENDED________
CHECHED________ APPROVED________
PHOENIX, ARIZONA MAY 1974 344-330-591

Interior – Reclamation, B.C., Nev. 7-74

Figure 5



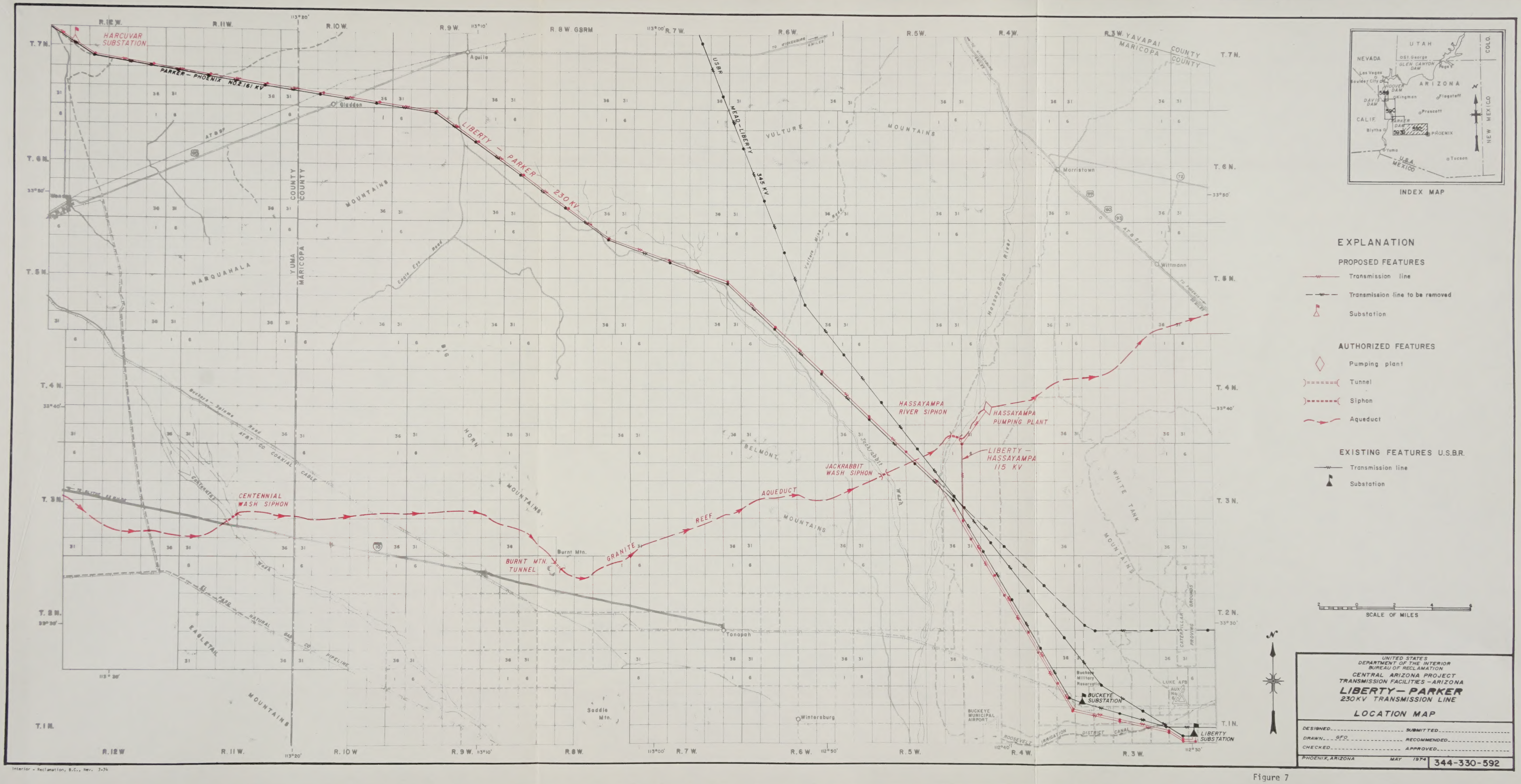
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES – ARIZONA
LIBERTY — PARKER
230KV TRANSMISSION LINE

LOCATION MAP

DESIGNED ________ SUBMITTED ________
DRAWN GFO ________ RECOMMENDED ________
CHECKED ________ APPROVED ________
PHOENIX, ARIZONA MAY 1974 344-330-593

Interior - Reclamation, B.C., Nov. 7-74

Figure 6



EXPLANATION

PROPOSED FEATURES

Transmission line

Transmission line to be removed

Substation

AUTHORIZED FEATURES

Pumping plant

Tunnel

Siphon

Aqueduct

EXISTING FEATURES U.S.B.R.

Transmission line

Substation

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES – ARIZONA

LIBERTY – PARKER
230KV TRANSMISSION LINE

LOCATION MAP

DESIGNED............ SUBMITTED............
DRAWN... GFO .... RECOMMENDED............
CHECKED............ APPROVED............
PHOENIX, ARIZONA MAY 1974 344-330-592

Interior – Reclamation, B.C., Nev. 7-74

Figure 7

Table 1
Transmission System Additions Serving the Granite Reef Aqueduct

Transmission Lines (230-kV)	Length (Miles)
McCullough Switching Station to Mead Substation	15.3
Mead Substation to Davis Dam Switchyard	68.3
Davis Dam to Parker Switchyard	71.0
Parker Switchyard to Liberty Substation	120.9
Total Length	275.5

Table 2
Radial Transmission System Serving the Pumping Plants

Voltage	Radial Transmission Line	Length (Miles)
230-kV	Parker Switchyard to Havasu Pumping Plant	2.2
115-kV	Harcuvar Substation to Bouse Hills Pumping Plant	22.6
115-kV	Harcuvar Substation to Little Harquahala Pumping Plant	26.8
115-kV	Liberty Substation to Hassayampa Pumping Plant	6.5 1/
	Total Length	58.1

1/ Does not include 19 miles of this transmission line double circuited with the Parker-Liberty 230-kV transmission line.

on Figures 5 and 6 indicates, the line crosses the Colorado River back into Arizona. It then runs in a southeasterly direction through the Harcuvar Substation terminating at the Liberty Substation located southwest of Phoenix, Maricopa County, Arizona (see Figures 6 and 7).

The mid-aqueduct pumping plant 115-kV radial transmission lines shown on Figures 6 and 7 originate at Harcuvar and Liberty Substations. The 230-kV Havasu Pumping Plant radial transmission line, shown on Figure 5, originates at the Parker Dam Switchyard.

Details of routing and location are presented in the following discussion of system design. Alternatives considered in developing the primary plans are presented in Chapter VIII.

3. System Design 1-3, 26-29, 116, 120-123

System studies were run to determine an integrated Federal transmission system which would serve all project loads in the area in the most economical and reliable manner. The system that connects a power source to loads should be designed to provide the greatest benefits with the least possible environmental impact. With these objectives defined, special considerations as well as established guidelines were used for the planning and designing of the system. The publication "Environmental Criteria for Electric Transmission Systems," published by the U.S. Departments of the Interior and Agriculture, is used as a guide for the planning and design of transmission systems. Design of the lines will also conform with Chapter 4 of Bureau of Reclamation Design Standards No. 4, "Power Systems," in effect at the time of final design of each line.

A more detailed discussion of Central Arizona Project load requirements as they relate to Navajo Project power entitlements may be reviewed in the final environmental statements for the Navajo Project, FES 72-1, and the Central Arizona Project, FES 72-35. The following subsections discuss the elements of the transmission system, including the power source and load requirements in summary form, and substations and transmission line segments.

The 230-kV backbone delivery system connecting the power source terminals was chosen because it will be most compatible with the existing systems to which it will be interconnected. Voltage ratings of the radial transmission lines were based on load requirements at the individual pumping plants.

a. Power Source and Terminals 1-3, 24, 25, 29, 127-129

The Bureau of Reclamation is a participant in the 2,250-MW Navajo Generating Station under construction near Page, Arizona. The Bureau of Reclamation's entitlement to electricity from the generating station is 24.3 percent of the plant capacity, or 546,750 kilowatts.

In addition to supplying power for operation of the CAP, the Navajo Generating Station will provide needed power for the non-Federal participants to supply load demands in other parts of Arizona and to portions of Nevada and California. The non-Federal participants and their percentages of participation are:

Salt River Project	21.7
Los Angeles Department of Water and Power	21.2
Arizona Public Service Company	14.0
Nevada Power Company	11.3
Tucson Gas and Electric Company	7.5

The Navajo Generating Station, a thermal coal-burning facility, consists of three units, each with a designed net output of 750,000 kilowatts. To meet the load requirements of the participants, the first unit was placed in commercial operation on May 31, 1974, while the second unit is scheduled for April 1975 and the third for April 1976. Because the inservice dates of the Navajo generating units occur prior to the Bureau of Reclamation's need for CAP pumping power, the Bureau entered into contracts with the Navajo Project participants and the Southern California Edison Company for interim sale of the United States entitlement to Navajo Project power. These contracts remain in effect for 20 years, or until power is needed for CAP purposes.

Approximately 775 miles of 500-kV transmission lines will be used to deliver power from the Navajo Generating Station to the two delivery points. One 500-kV line runs west for a distance of 275 miles from the generating station to the McCullough Switching Station near Boulder City, Nevada. Two 500-kV lines each run 250 miles south and link the generating station with the Westwing Substation in the Phoenix area by way of Moenkopi Switchyard near Cameron, Arizona. These 775 miles of Navajo transmission lines are separate from those covered in this statement and are discussed in detail in the final environmental statement for the Navajo Project, FES 72-1. An existing 230-kV intertie connects the Westwing Substation to the Liberty Substation. The McCullough Switching Station and the Liberty Substation are the delivery points for the power from the Navajo Generating Station that will serve the Granite Reef Aqueduct pumping plants.

b. Load Requirements [1-3, 25, 127]

Table 3 lists presently anticipated power requirements in horsepower and megawatts at each CAP pumping plant on the Granite Reef Aqueduct. Data are included for the project with Granite Reef Aqueduct capacity of 3,000 cubic feet per second (ft^3/s). Total estimated CAP pumping loads for the Salt-Gila and Tucson Aqueducts are also indicated on the table to give a total CAP pumping load.

The Orme-Granite Reef Pumping Plant is designed to pump releases from Orme Reservoir to the Salt-Gila Aqueduct when the aqueduct

Table 3
POWER REQUIREMENTS FOR THE GRANITE REEF AQUEDUCT

Pumping Plant	Pumping Efficiency (Percent)	Location (Miles)	Total Dynamic Head (Feet)	Discharge (ft^3/s)	Horse-power	MW Demand at High Voltage Side of Bus 1/
Havasu	85.6	0.0	820	3,000	326,400	285
Bouse Hills	87.7	20.0	105	3,000	40,800	35
Little Harquahala	87.7	50.1	105	3,000	40,800	35
Hassayampa	92.0	117.2	175	3,000	65,000	56
Total						411
Estimated other CAP pumping load 2/						69
Total CAP pumping load						480

1/ The demand at the high-voltage side of the bus was obtained by converting horsepower to megawatts - then dividing by 0.90 to allow for pump manufacturer's overbuilding to meet warranties, extra capacity to cover wear, etc. This answer is again divided by 0.95 to allow for motor efficiency and power transformer and station auxiliary losses.

2/ Another pumping plant, not listed above, called the Orme-Granite Reef Pumping Plant, will be required. This plant is designed to pump releases from Orme Reservoir to the Salt-Gila Aqueduct when the aqueduct is not carrying Colorado River water to full capacity. It would therefore not be used when the aqueduct system was operating at maximum capacity and would not add to the maximum power demand.

is not carrying Colorado River water to full capacity. It would, therefore, not be used when the aqueduct system was operating at maximum capacity and would not add to the maximum power demand.

The total megawatt demand at the high-voltage side of the bus was multiplied by 1.09 to allow for transmission system losses. For the 3,000-ft^3/s, the 480-MW demand (disregarding the Orme-Granite Reef Pumping Plant) at the high-voltage side of the bus at the pumping plant requires a 523-MW output at the power source.

To meet the estimated CAP load, the Secretary of the Interior, in 1969, contracted for an entitlement of 24.3 percent of the then 2,310-MW capacity of the Navajo Generating Station, or 561 megawatts. Subsequent to this contract, however, the generating plant station service load requirements have increased to operate wet-scrubbers and other items of equipment for environmental protection. The present plant rating is 2,250 megawatts and the 24.3-percent entitlement of this capacity is 546.75 megawatts.

c. Substations and Switchyards

Existing substations, switchyards, and switching stations will be terminals for segments of the system and will have additional facilities constructed onsite to accommodate the new interconnections. One new substation named Harcuvar will be located approximately 8.5 miles north of Wenden, Arizona.

(1) McCullough Switching Station

The McCullough Switching Station (Figure 8), located about 20 miles southwest of Boulder City, Nevada, in Clark County, is owned jointly by the Los Angeles Department of Water and Power, Nevada Power Company and the Salt River Project and is operated by the Los Angeles Department of Water and Power (LADWP) for use and benefit of LADWP, the United States and the Nevada Power Company. It is the western terminal and delivery point for power from the Navajo Generating Station. At this facility, the voltage from the Navajo Project will be reduced from 500 kV to 230 kV. Terminal facilities including 500-kV and 230-kV circuit breakers, transformers, disconnect switches and associated steel structures will be installed as part of the CAP system. The design and location of the equipment will be compatible with the existing structures and will be installed with the approval of LADWP. Upon completion of additions to the facility the contractual ownership percentage will be reallocated.

(2) Mead Substation

34

The Mead Substation (Figure 9), located about 3 miles south of Boulder City, Nevada, in Clark County, is owned and operated by the Bureau of Reclamation. The black line at the top of Figure 9 indicates the alinement of the McCullough-Mead interconnection. The other line represents the beginning of the Mead-Davis transmission line. Additions to Mead Substation will consist of terminal facilities for the Mead-Davis 230-kV line and McCullough-Mead 230-kV interconnection. New equipment will consist of three 230-kV power circuit breakers along with associated steel structures, disconnect switches, and buses.

The additions will be located in spare bay positions inside the existing substation and will be compatible with the existing low profile design. Paints of various hues will be used at this substation to identify the types of electrical equipment and to express their functions as well as to enhance the overall esthetic appearance of the station. Some typical colors for substation equipment are: Desert Beige, Almond Green, Stainless Steel Blue and Glacier Green. International Orange is used to identify energized portions of equipment.

(3) Davis Switchyard 34, 118

The Bureau of Reclamation owns and operates the Davis Switchyard (Figure 10) as part of the Federal power system. Additions to the switchyard, which are located in Mohave County, Arizona, near Bullhead City, will consist of terminal facilities for the Mead-Davis 230-kV and Davis-Parker 230-kV No. 2 Lines. A sectionalizing breaker will also be added to improve reliability. The new lines will require the relocation of numerous approach spans into the Davis Switchyard to avoid the use of high towers for crossovers. The original construction of this switchyard provided space for additions and it is this portion of the yard that will be used. Additions will be of the lattice-steel-box type similar to the existing steel structures. The existing fence will be extended and two new bays will be installed. The extension of the fence will encompass approximately 47,000 square feet of already cleared and leveled land.

In addition to relocating the approach spans to present a more pleasing overall appearance, equipment will be painted to identify its function and improve its appearance as described for Mead Substation.

(4) Parker Switchyard 34, 130

Construction at the Parker 230-kV Switchyard (Figure 11) will consist of adding terminal facilities for the Davis-Parker 230-kV No. 2 Line, Liberty-Harcuvar-Parker 230-kV line, and Parker-Havasu Pumping Plant 230-kV line, as well as a 230-kV sectionalizing breaker and a 230-kV bus tie breaker together with associated buses and switches.

The existing switchyard, operated by the Bureau of Reclamation as a part of the Federal power system, is located in San Bernardino County, California, just west of the Colorado River near Parker Dam.

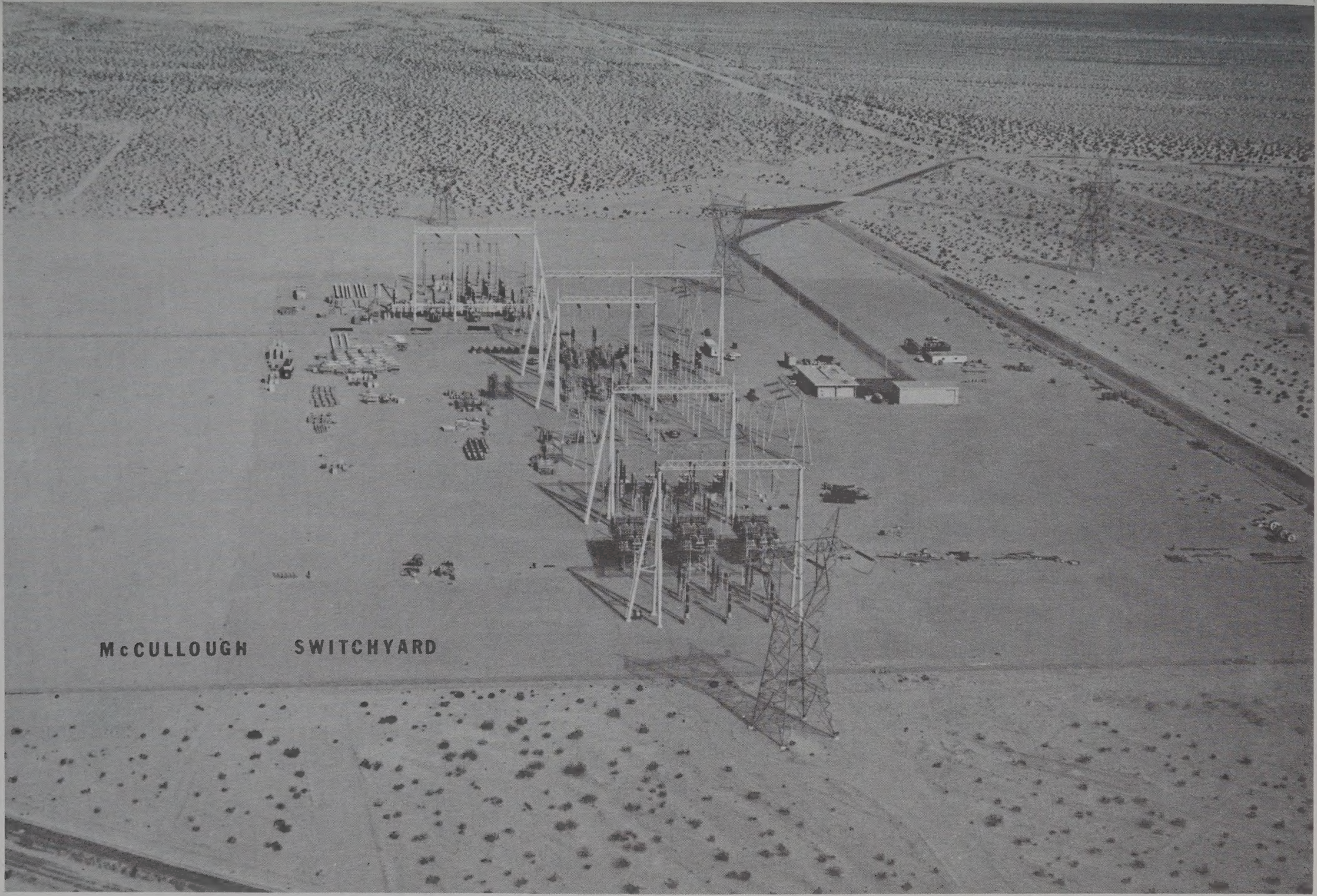


Figure 8. McCullough Switching Station--View northeast showing the switchyard and existing transmission lines--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01281NA.

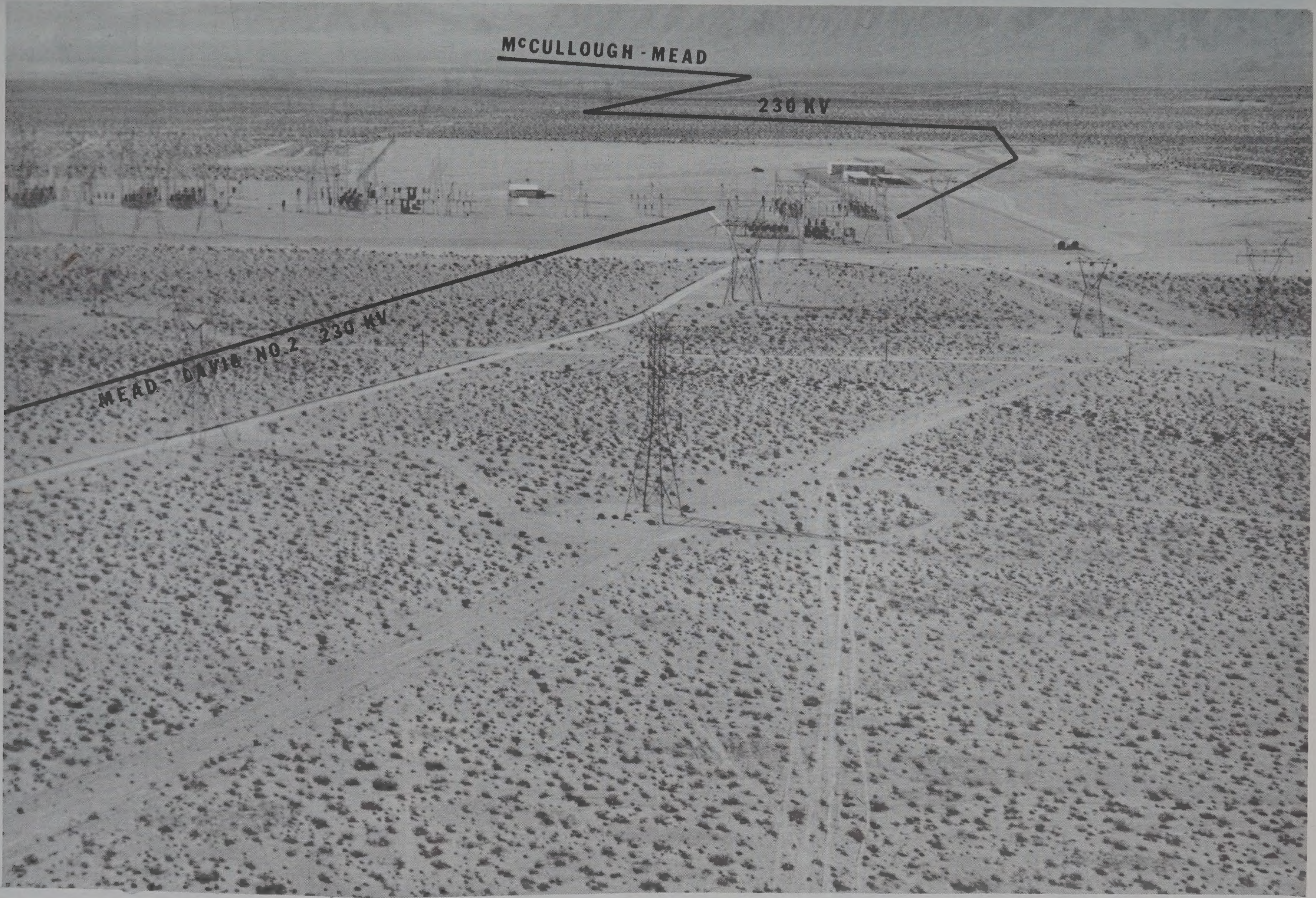


Figure 9. Mead Substation--View west in northern part of Eldorado Valley showing transmission alinement and substation. The vegetation is sparse creosote and scattered bursage and Mohave yucca--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01233NA.

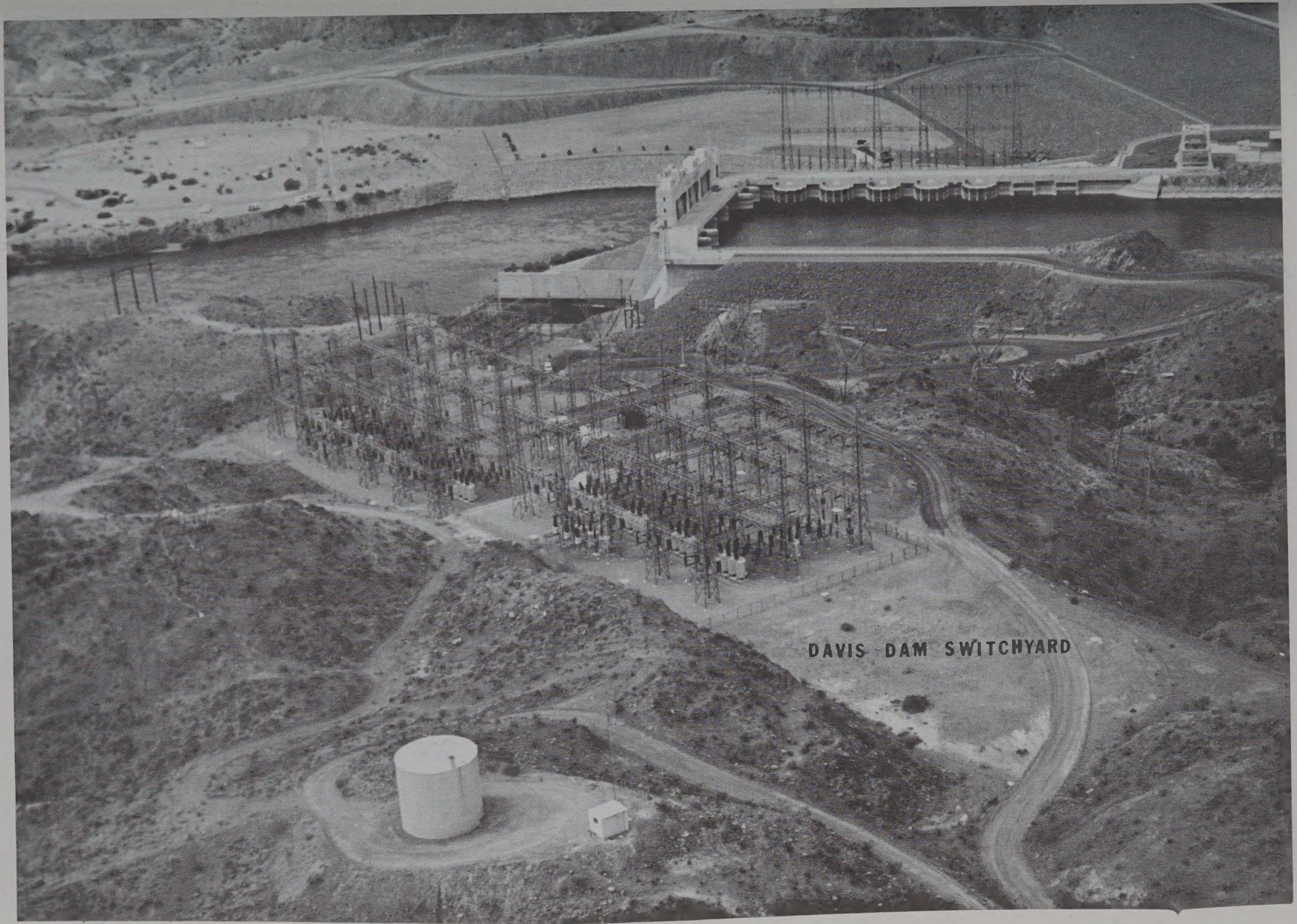


Figure 10. Davis Switchyard--View northwest showing the existing 230-kV switchyard of the Parker-Davis System and the existing cleared area for the substation addition--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01279NA.

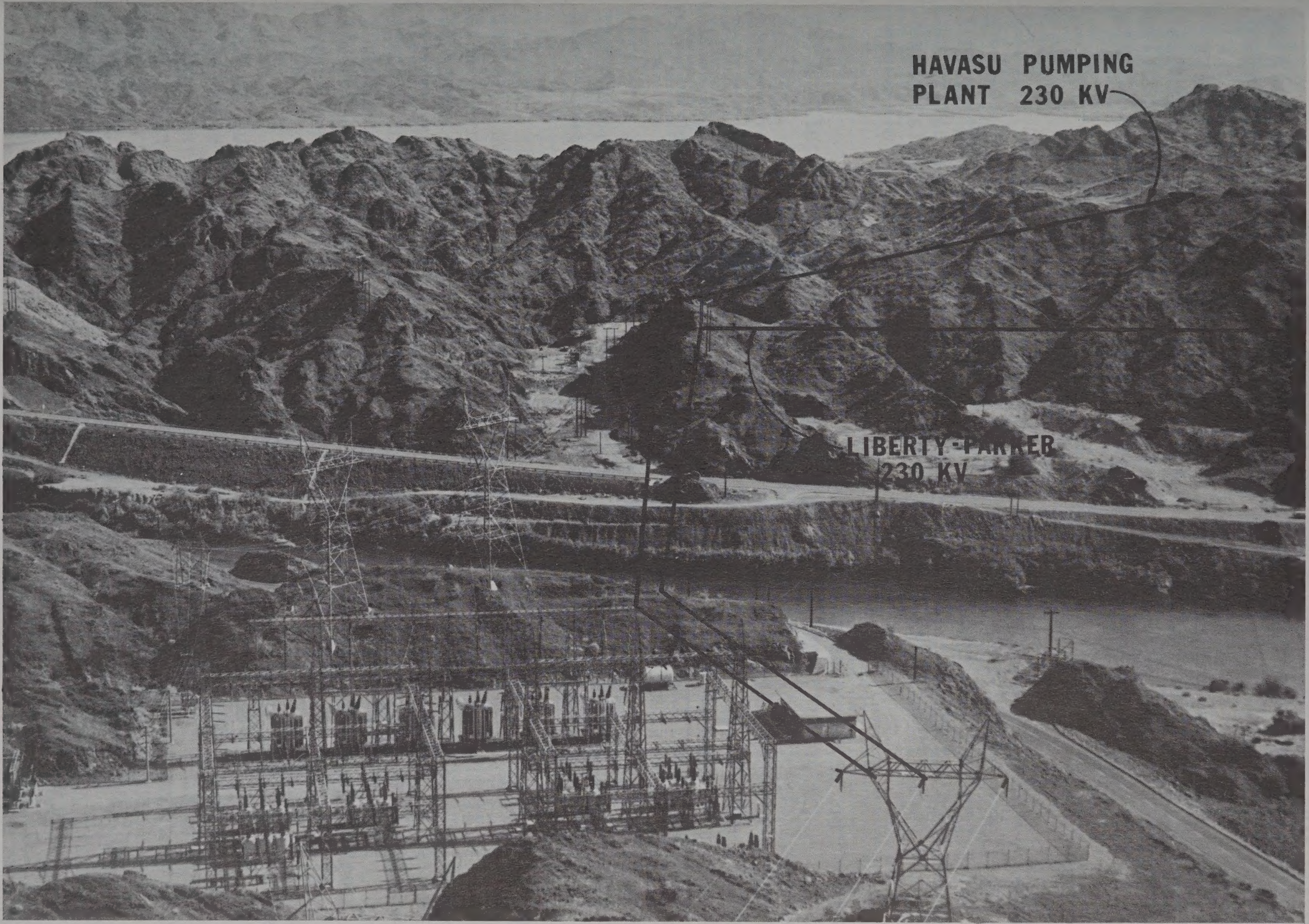


Figure 11. Colorado River Crossing from Liberty-Parker Switchyard--View east showing the alinement of the Liberty-Parker 230-kV line and the Havasu Pumping Plant 230-kV feeder line--Liberty-Parker 230-kV Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01160NA.

Space was provided for future additions when this switchyard was constructed. The additions will be located within the existing fenced area.

Within the switchyard, extensions of the conventional lattice-type galvanized steel structures that are compatible with the existing installation (Figure 11) will be used. Painting of equipment will be similar to that described for Mead Substation.

(5) Harcuvar Substation

The Harcuvar Substation will be a new substation owned by the Bureau of Reclamation and will be required to reduce the system line voltage from 230 kV to 115 kV to provide power to the Bouse Hills and Little Harquahala Pumping Plants. From this substation, radial transmission lines will be routed to the Bouse Hills and Little Harquahala Pumping Plants.

A 10-acre site (Figure 12) has been selected approximately 8-1/2 miles north of Wenden in Yuma County, Arizona, in Section 17, T. 7 N., R. 12 W., that permits the use of existing landforms for screening from public view. Preparation for the site by leveling will require excavation on one side to provide the material for an embankment on the other side. Surfacing will be gravel. Approximately 3-1/2 acres of additional land will be needed for a 1-mile-long access road to connect to an existing road.

Approximately 7 acres of the site will be fenced to enclose the equipment including 230-kV and 115-kV circuit breakers and transformers and a control building approximately 20 feet wide by 60 feet long.

Storage facilities for equipment oil may be required and will possibly consist of two storage tanks of about 20,000 gallons each. Provisions for spill protection for the storage tank and oil-using equipment areas will be incorporated into the design even though the tanks will normally be empty except during maintenance periods. A spill prevention control and countermeasure (SPCC) plan will be prepared within 6 months after operations have begun to comply with Oil Pollution Prevention Regulations. One form that this can take is an impervious embankment and basin around the tanks to contain any possible spills.

The structures and equipment will be of the low-profile design, such as shown in Figure 13, in order to enhance the overall appearance of the facility, and the control building will be designed to be architecturally compatible with its surroundings. Although the substation will be unattended, sanitary facilities will be provided for maintenance personnel. These facilities will meet local health standards. Painting of electrical equipment will be similar to that described for Mead Substation.

(6) Liberty Substation [34]

The Bureau of Reclamation's Liberty Substation, (Figure 14) located in Maricopa County about 20 miles west of Phoenix, Arizona, is the southern terminal of the Pacific Northwest-Pacific Southwest Intertie system. It connects the Phoenix area to Mead Substation with a 345-kV transmission line and to Navajo Generating Station through the Westwing Substation by a 230-kV line, (Figure 2).

The Liberty Substation, like the Mead Substation, is one of the first to be designed and constructed using compact, low-profile equipment and structures. The additions will be compatible with the existing equipment and will be painted various colors to identify and express its function as well as enhance its appearance, such as described for Mead Substation.

This substation will be the terminal for a 230-kV delivery system and the terminal for power delivery through a 115-kV radial transmission line to the Hassayampa Pumping Plant. Equipment will include 230-kV circuit breakers and a 230/115-kV transformer. All the additions will be constructed within the existing station area in space provided for future expansion.

d. Transmission Lines [128, 129]

Transmission lines will connect each of the substations (or switching stations and switchyards) along the interconnected delivery system. This discussion will describe the lines and routing between stations beginning at the McCullough Switching Station and terminating at the Liberty Substation.

The system will generally use towers constructed of free-standing, lattice steel with a galvanized finish as shown in Figure 15. The average span between towers will be 1,200 feet and each tower will range from 80 to 130 feet in height, depending on the terrain. The towers will support three phases in a horizontal configuration and two insulated overhead ground wires. The ground wires, which are mounted at the top of the towers, are to provide protection from lightning and a communication channel. The conductor material will be aluminum conductor steel reinforced (ASCR) cable. The possible use of nonspecular conductor is being evaluated.

(1) McCullough Switching Station to Mead Substation

The first segment of the transmission system begins at McCullough Switching Station and terminates at Mead Substation. The 15-mile-long route parallels transmission lines owned and operated by Southern California Edison Company, Nevada Power Company and the City of Los Angeles over an area of generally flat terrain. The routing from the McCullough Switching Station runs north about 3 miles, then

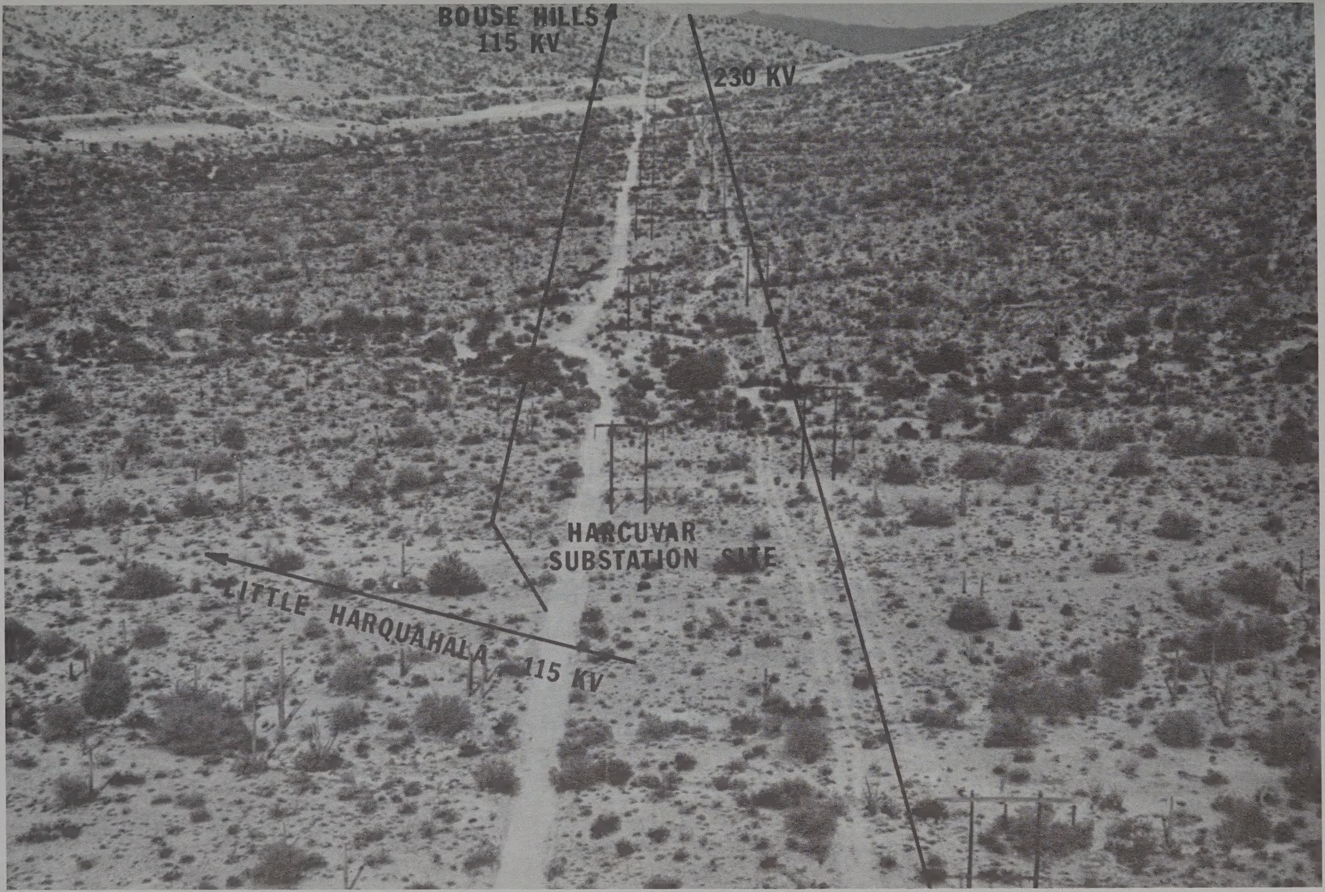


Figure 12. Harcuvar Substation Site--View northwest toward Cunningham Pass showing the 230-kV replacement transmission system, the Bouse Hills and Little Harquahala 115-kV pumping plant lines, and substation location. The vegetation of this area is saguaro cacti, creosote bush, ocotillo, grasses, and forbs. The substation site will require minimum earthwork and vegetation removal--Liberty-Parker 230-kV Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01138NA.

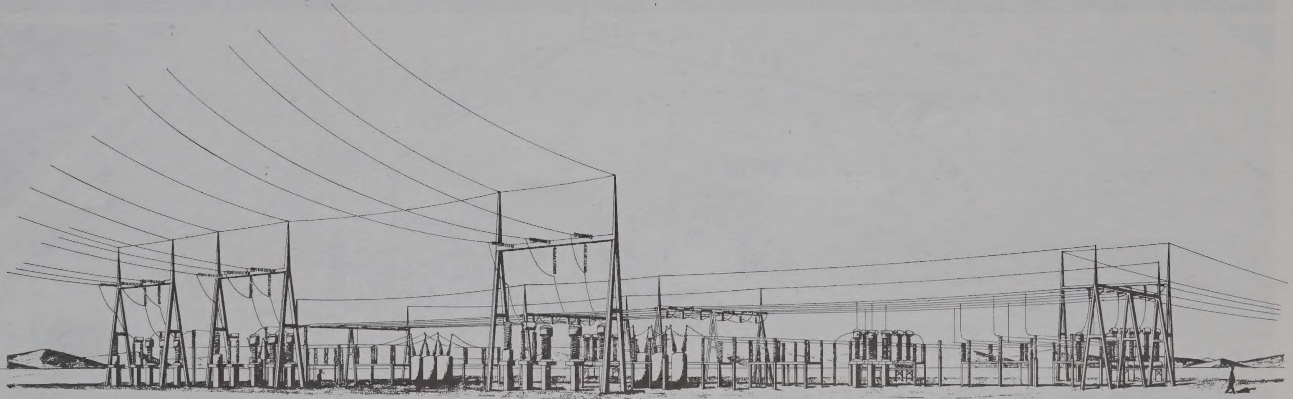


Figure 13. Typical low profile design of the type that may be used for the Harcuvar Substation--Transmission System, Granite Reef Aqueduct, Central Arizona Project.

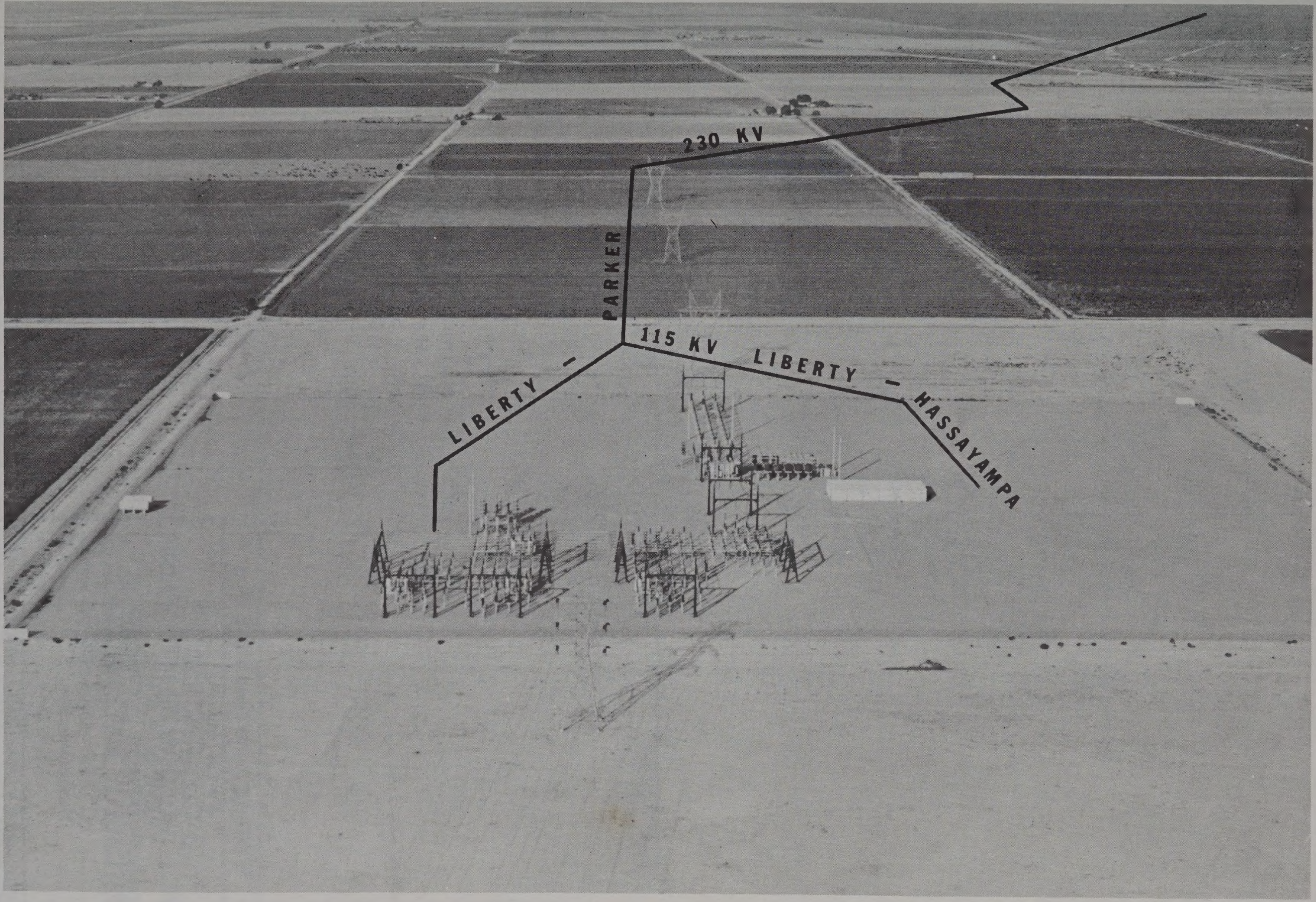
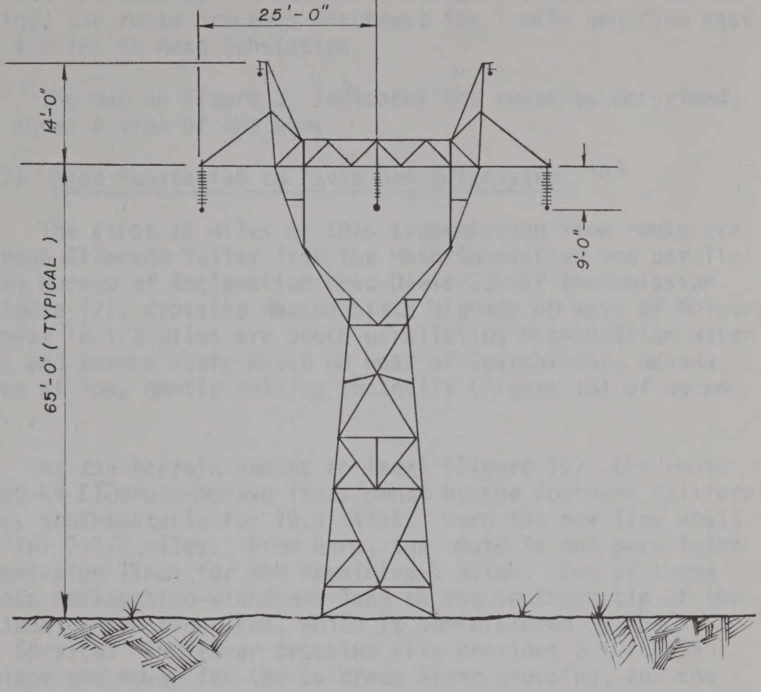


Figure 14. Liberty Substation--View west showing the transmission system alinement crossing irrigated agricultural lands--Liberty-Parker 230-kV Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01117NA.



NOTE

Dimensions shown are typical and may change when final designs are completed. They are indicated to show relative sizes of structures for comparison purposes only.

ALWAYS THINK **SAFETY**

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

230KV TRANSMISSION LINE
SINGLE CIRCUIT
HORIZONTAL CONFIGURATION
STEEL LATTICE STRUCTURE

DRAWN Bil' Regan SUBMITTED
TRACED RECOMMENDED
CHECKED APPROVED

PHOENIX, ARIZONA MAY, 1974 344-330-T-288

Figure 15

northeast for 7 miles where it crosses U.S. Highway 95 and a buried gasline owned and operated by the Southwest Gas Corporation. From the highway crossing, the route proceeds northeast for 1 mile and then east approximately 4 miles to Mead Substation.

The map on Figure 3, indicates the route as described, and Figure 16 shows a view of the area.

(2) Mead Substation to Davis Dam Switchyard 133

The first 18 miles of this transmission line route are southwest through Eldorado Valley from the Mead Substation and parallel to the existing Bureau of Reclamation Mead-Davis 230-kV transmission line No. 1 (Figure 17), crossing Nevada State Highway 60 west of Nelson, Nevada. The next 18-1/2 miles are south paralleling Metropolitan Water District lines and across State Route 68 west of Searchlight, Nevada, through an area of low, gently rolling foothills (Figure 18) of decomposed granite.

As the terrain begins to level (Figure 19), the route follows the 500-kV Eldorado-Mohave lines owned by the Southern California Edison Company, southeasterly for 19.3 miles. Here the new line would turn due east for 7-1/2 miles. From here, the route is not paralleled by other transmission lines for the remaining 5 miles. Two of these miles are across Reclamation-withdrawn land at the southern tip of the Lake Mead National Recreation Area, which is administered by the National Park Service. The river crossing site provides a suitable location to place the tower for the Colorado River crossing, and the span will meet the Corps of Engineers' safety requirements for navigation clearance. After the river crossing, the line extends about 1 mile to the Davis Dam Switchyard in Mohave County, Arizona, near Bullhead City. The above described route is shown on Figure 3.

The National Park Service is proposing that portions of the Lake Mead National Recreation Area be designated as a Wilderness Area but the proposed new transmission lines will be routed so as to avoid these areas. This proposal is described in the NPS draft environmental statement on the Proposed Wilderness Areas, Lake Mead National Recreation Area, Arizona and Nevada, DES 74-3.

(3) Davis Dam Switchyard to Parker Dam Switchyard

The alinement for this system segment is shown on the map of Figure 4. From the Davis Dam Switchyard, the 71-mile Davis-Parker 230-kV No. 2 segment will parallel the existing Bureau of Reclamation Davis-Parker 230-kV No. 1 transmission line (Figure 20) to a point approximately 10 miles north of Lake Havasu City, Arizona. From this point the new line diverges from the existing lines and heads in a southeasterly direction along the foothills of the Chemehuevi Mountains. Portions of this section of the alinement are very rough, with high rocky ridges and boulder-strewn canyons that restrict vehicular travel in the area (Figure 21). Large, wide washes and steep, narrow ridges with rocky outcrops will permit the use of washes as access to the line for construction and maintenance. This route was selected to bypass Lake Havasu City to avoid additional impacts on the residents of the community. Since publication of the draft environmental statement a definite site for the Citizens Utilities Company's Havasu Substation has not been selected and the proposed route of Reclamation's transmission line has been changed to the route identified as Alternate "A" in the draft environmental statement.

Approximately 6 miles southeast of Lake Havasu City, the line will again parallel the existing line and utilize the present access roads. As shown on Figure 4, approximately 4 miles north of Parker Dam, the alinement crosses a travel trailer park (Figure 22), parallels U.S. Highway 95 for a short distance, then is routed to the east shore of Lake Havasu. Approximately 4 miles of the line between Lake Havasu City and the Lake Havasu crossing are within Lake Havasu State Park, which is on Federal land administered by the State of Arizona. The lake crossing into California (Figure 23) and to the Parker Dam 230-kV Switchyard will be adjacent to the existing Davis-Parker 230-kV No. 1 transmission line and the CUC's Lake Havasu City 69-kV transmission line in an established transmission line lake crossing. After the lake crossing, the line proceeds in a southerly direction for approximately 1.2 miles and terminates into an existing bay position at the Parker 230-kV Switchyard.

(4) Parker Dam Switchyard to Liberty Substation via Harcuvar Substation

The 230-kV transmission line that will extend from the Parker Dam Switchyard to the Liberty Substation near Phoenix, will be interconnected with the substation at Harcuvar. The 121-mile-long line will replace the existing Parker-Phoenix 161-kV line No. 1 that is 137 miles long, utilize its right-of-way and parallel the existing 161-kV Parker-Phoenix No. 2 line. The differences in line lengths are due to termination of the new line at Liberty Substation instead of Phoenix Substation which is further east and the last 19 miles of right-of-way for the line at the Liberty end will follow a new alinement. That portion of the Parker-Phoenix No. 1 line right-of-way between Phoenix Substation and Liberty Substation will be retained for use of a future line between Phoenix and Liberty. The portion of Parker-Phoenix No. 1 line right-of-way between a point north of Liberty Substation to where it meets the Liberty-Parker 230-kV line will be allowed to return to other land uses. Approximately 25 feet of additional right-of-way width will be acquired where the new line utilizes existing right-of-way.

From the Parker Dam Switchyard in California (Figures 4 and 11), the route crosses the Colorado River into Arizona near the Parker Dam Powerplant. After paralleling Arizona State Highway 95 for approximately

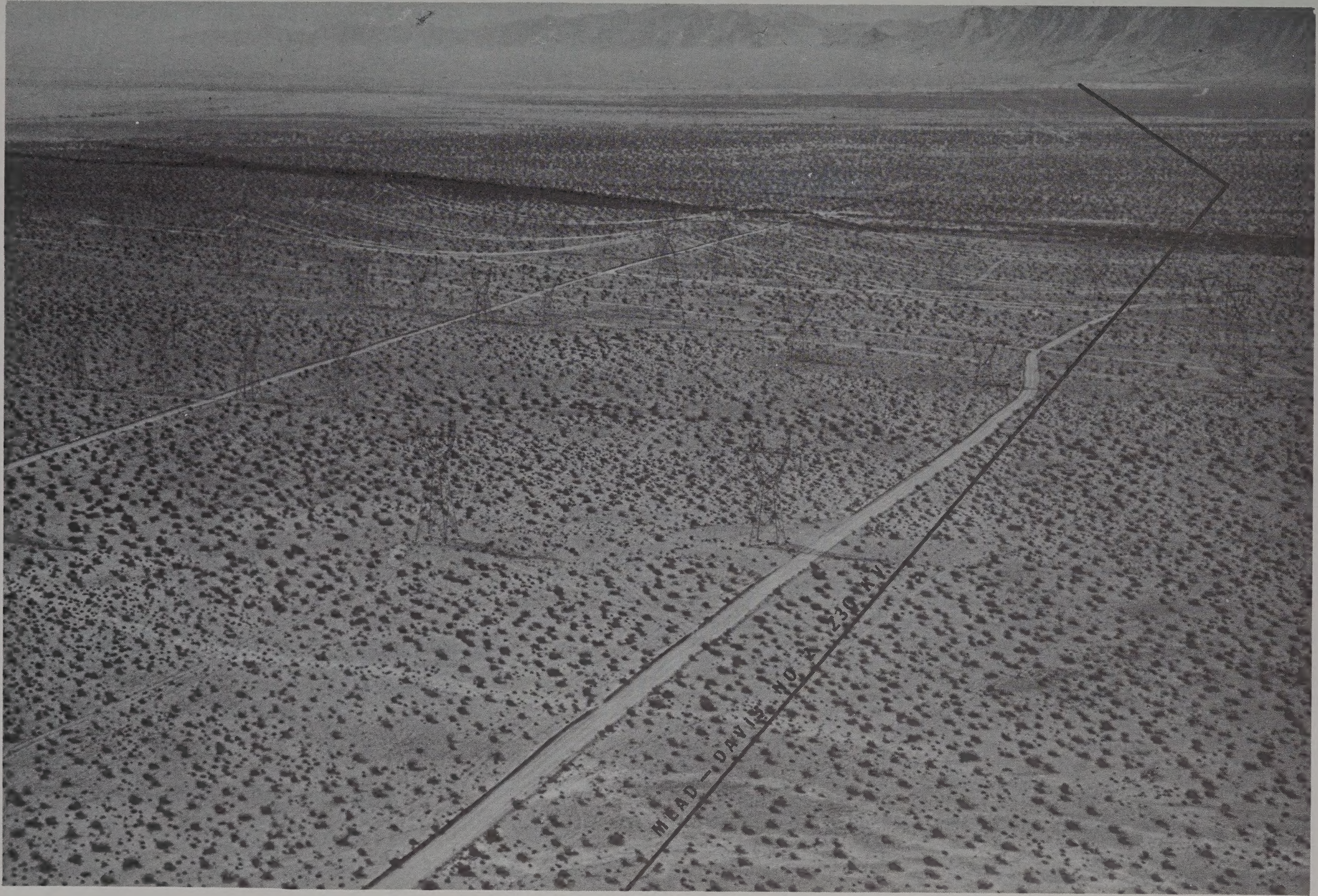


Figure 16. Northern Eldorado Valley--View of the alinement southwest toward the Eldorado Mountains showing existing 3-287.5-kV and 6-230-kV transmission lines crossing. In a creosote-bursage vegetation community--Mead-Davis 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01286NA.

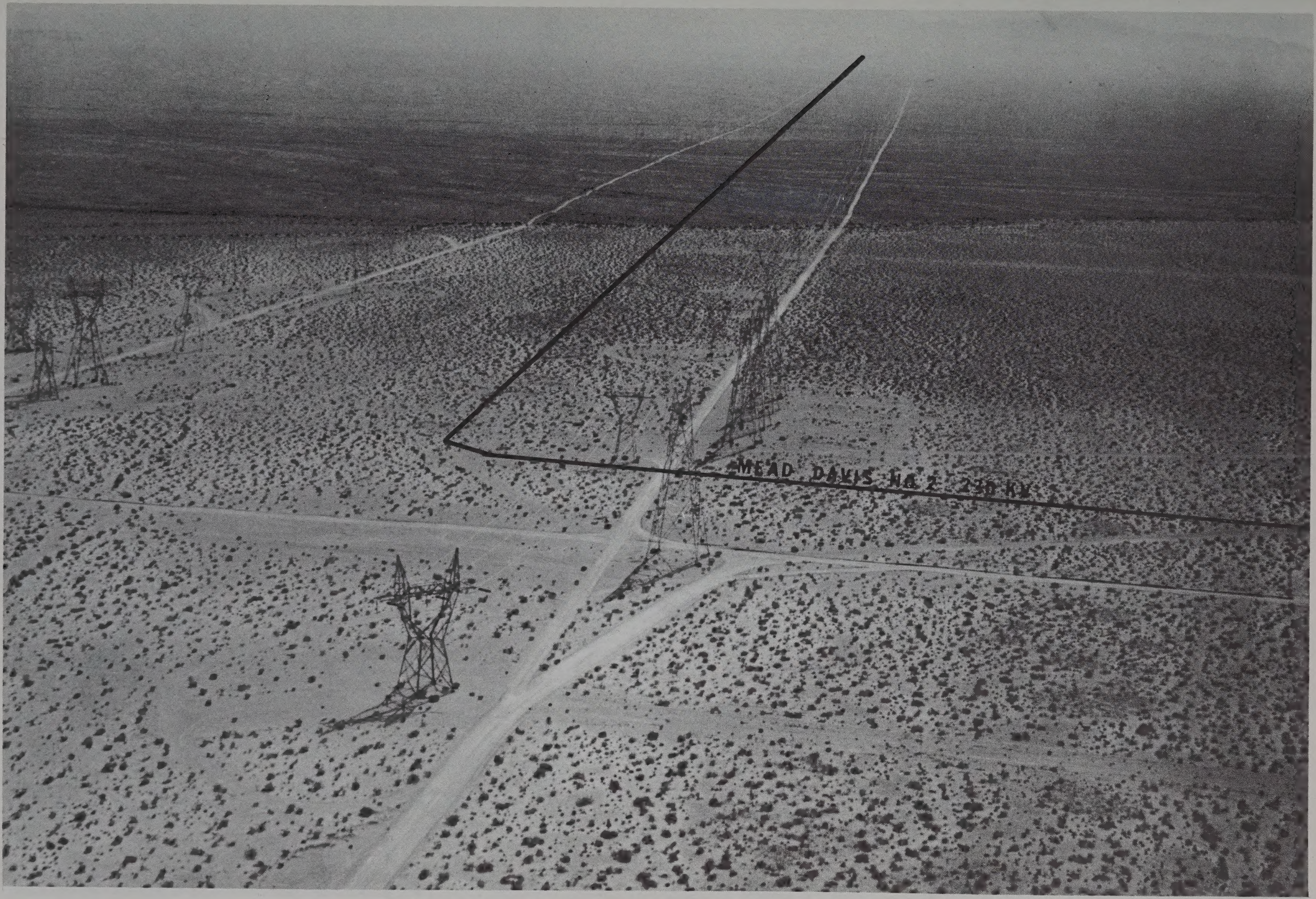


Figure 17. Eldorado Valley--View south of the alinement where the line will parallel the two Metropolitan Water District 230-kV lines and the USBR Mead-Davis 230-kV No. 1 line--Mead-Davis 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01237NA.

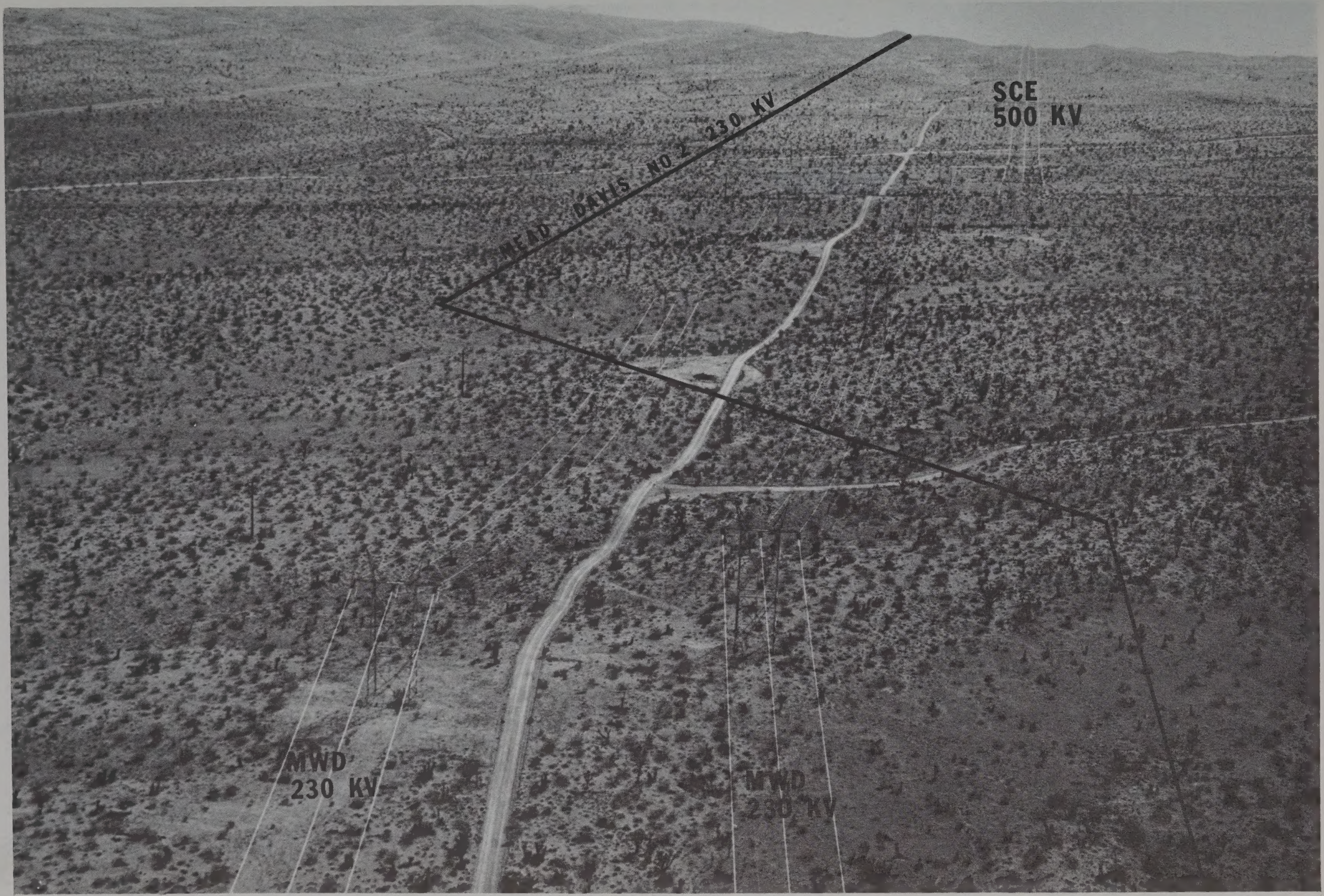


Figure 18. Crossing Under the Two Metropolitan Water District Lines--View south of Searchlight, Nevada, showing the other transmission systems in the area--Mead-Davis 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01252NA.

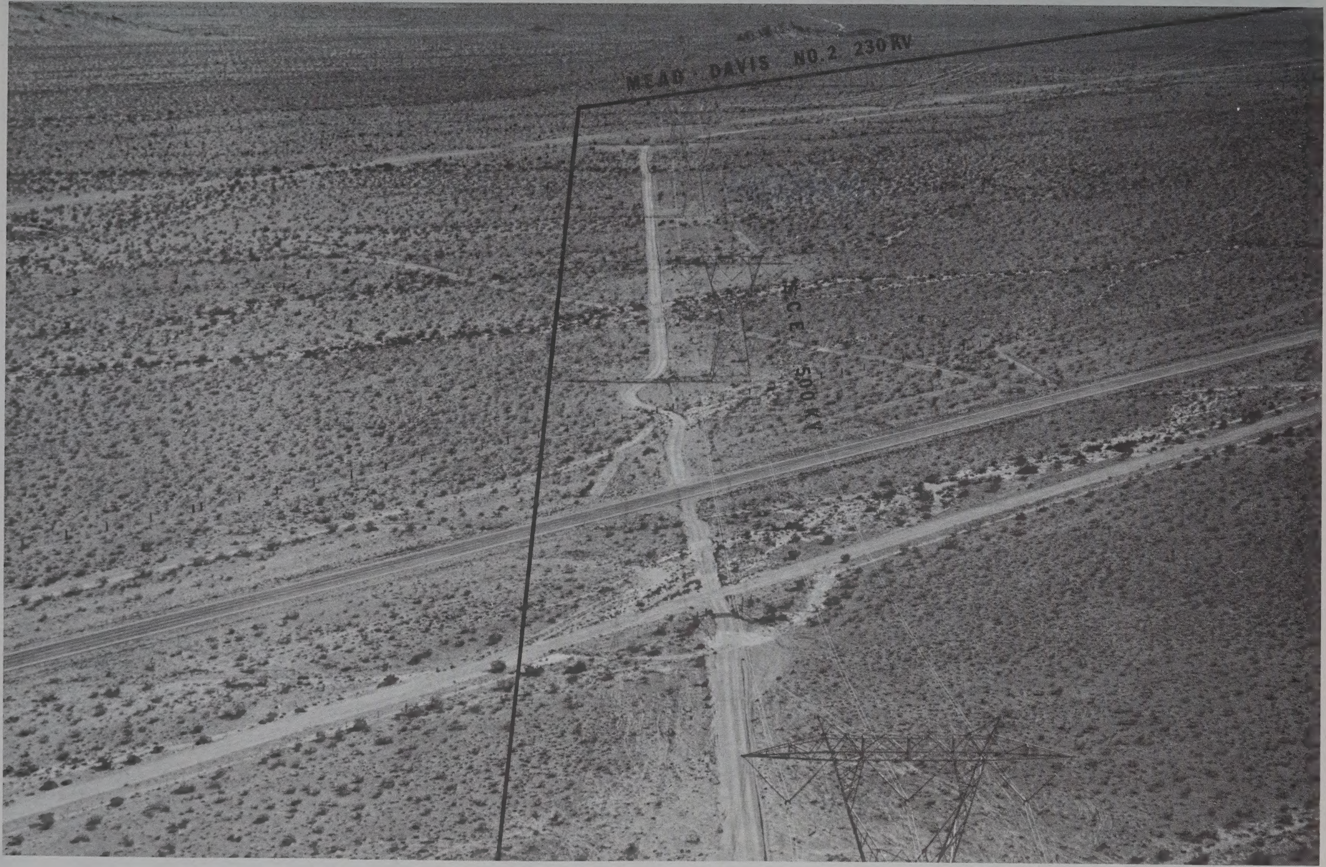


Figure 19. Piute Valley--View southeast where alinement crosses U.S. Highway 95 south of Searchlight, Nevada, parallel to the Southern California Edison 500-kV line. The principal vegetation of the area is creosote-bursage with scattered acacia and Joshua trees--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01260NA.

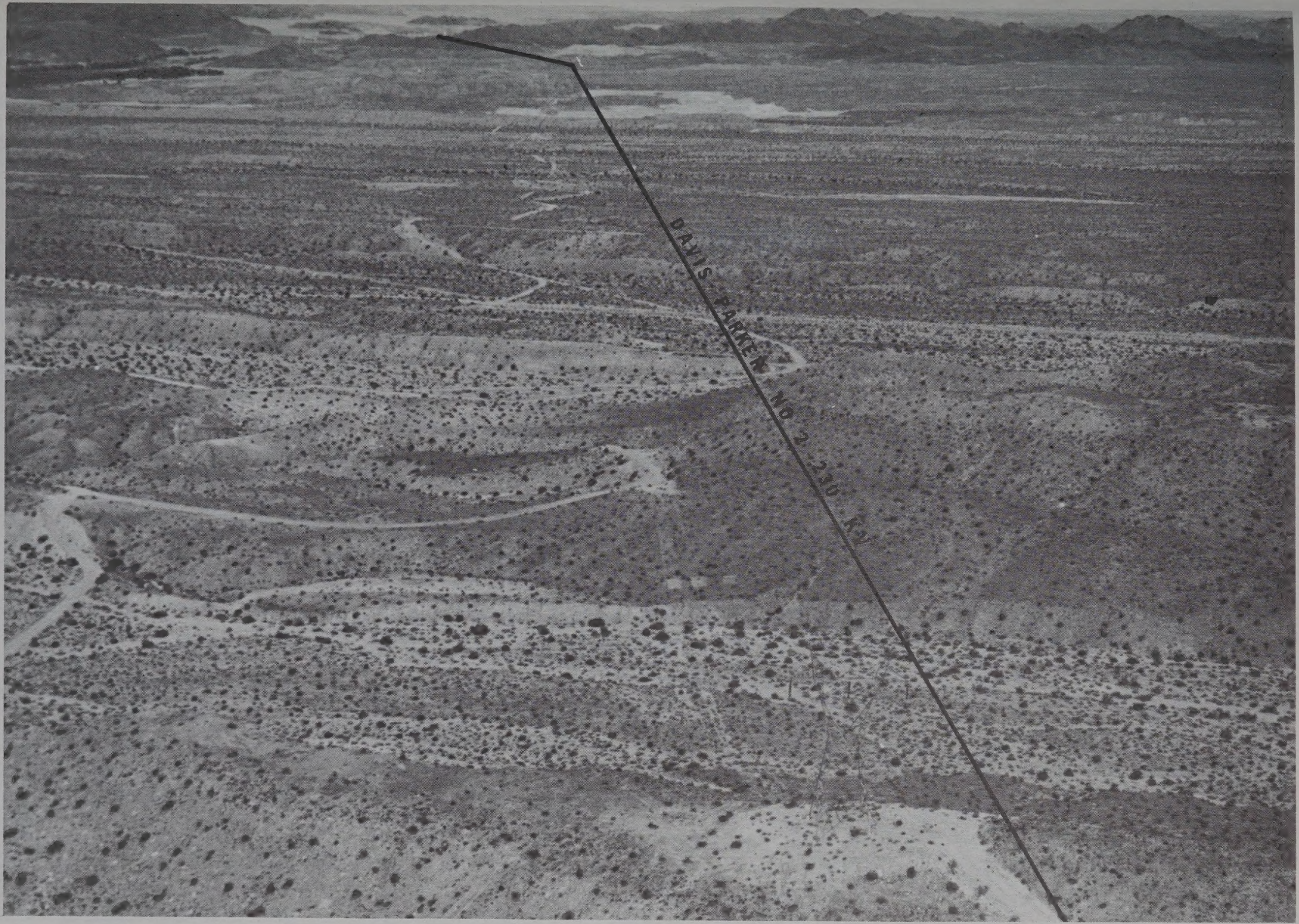


Figure 20. Davis Dam to Silver Creek Wash Area--View north toward Lake Mohave. Showing a creosote-bursage and cane cholla vegetation community--Acacia can be observed along the washes and arroyos--Davis-Parker 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01194NA.

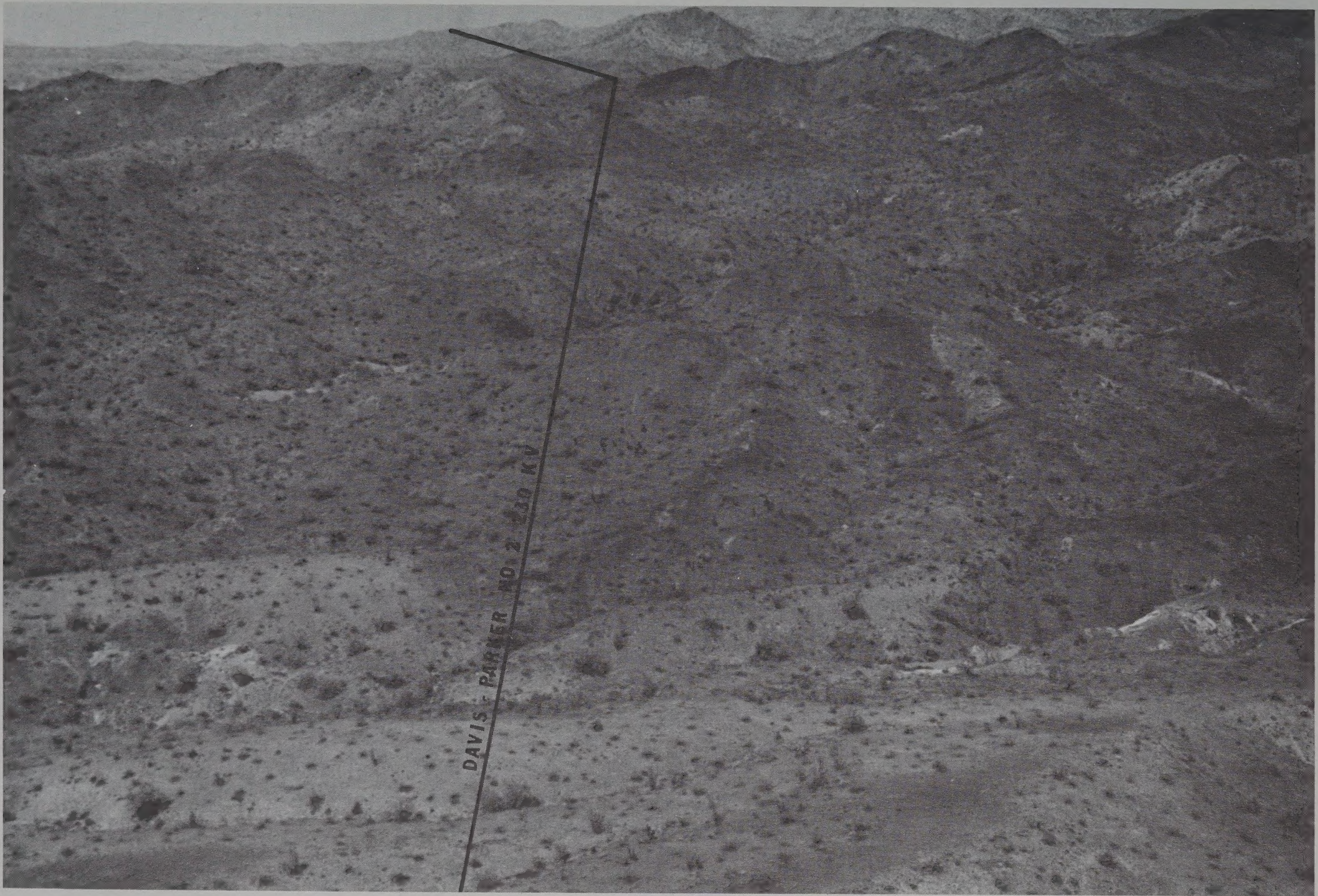


Figure 21. Lake Havasu Bypass Alinement--View northwest toward Chemehuevi Mountains--Davis-Parker 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01213NA.

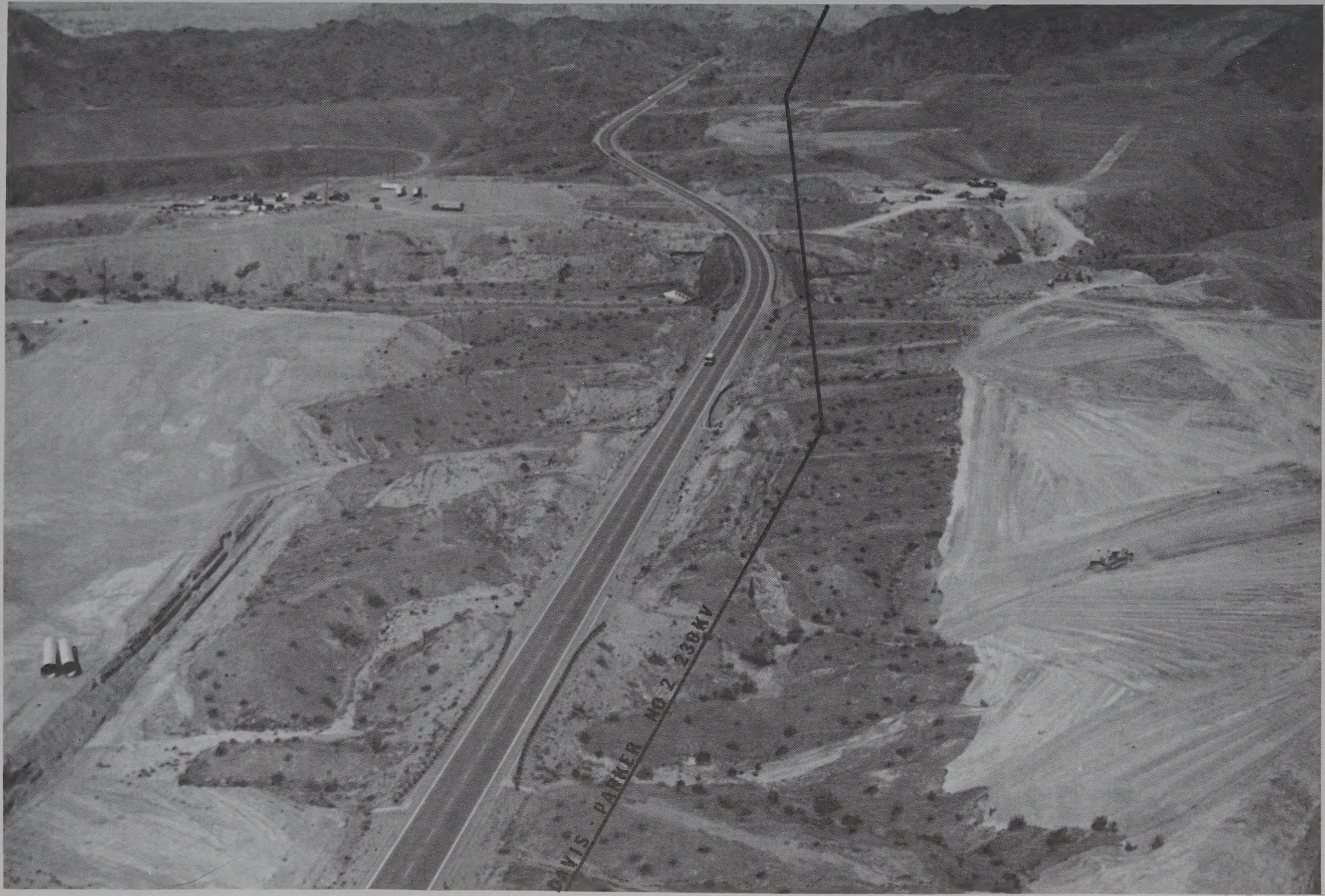


Figure 22. Lake Havasu Travel Village Area--View north showing the alinement through the village and parallel to Arizona State Highway 95--Davis-Parker 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01226NA.

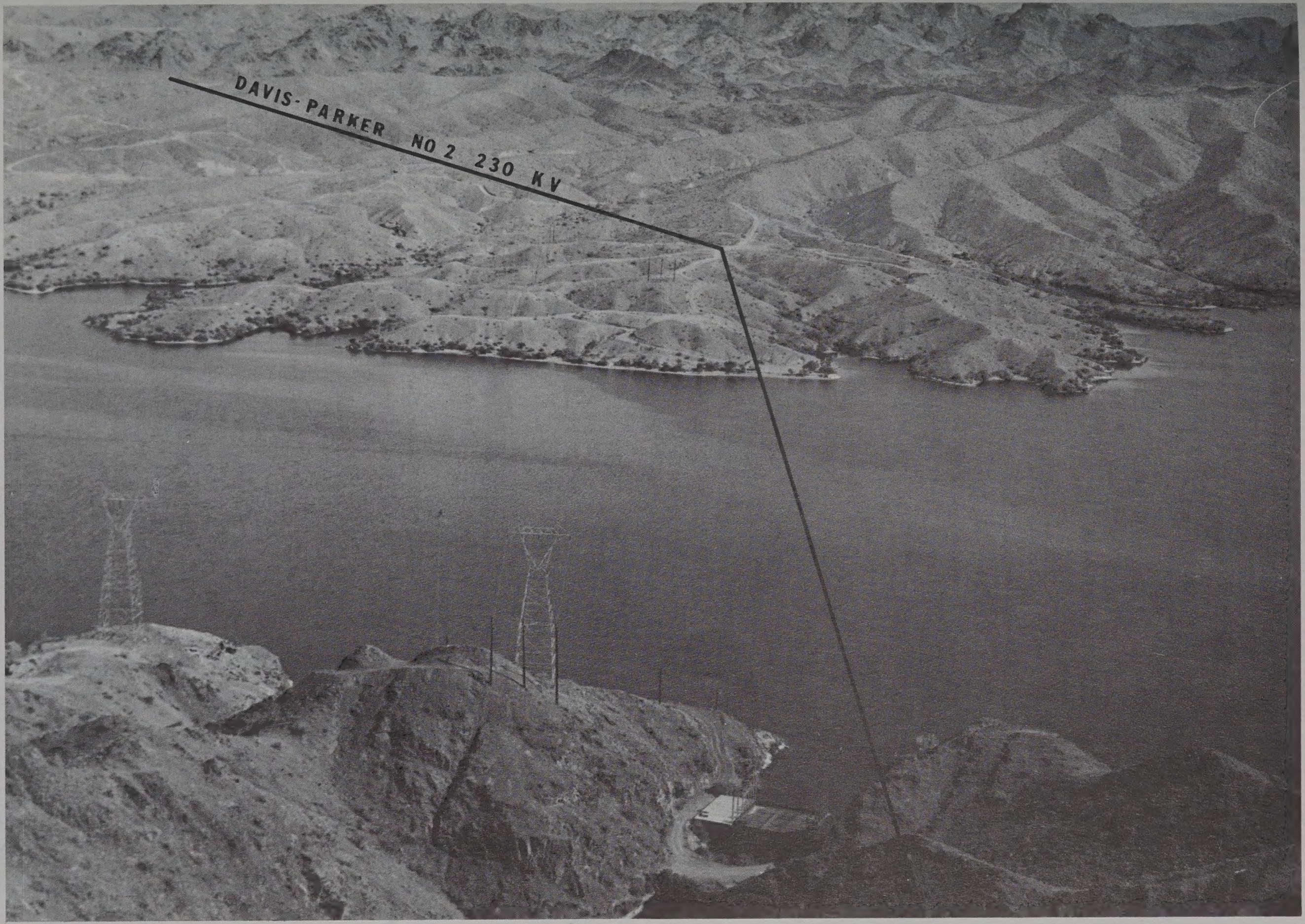


Figure 23. Lake Havasu Crossing--View northeast showing the lake crossing before entering California and Parker Switchyard--Davis-Parker 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photo No. P344-300-01230NA.

1-1/2 miles and passing through an existing mobile home park, the line will cross the Buckskin Mountains through Giers Wash (Figure 24) across the Cactus Plain and Butler Valley paralleling the existing 161-kV line. About 8 miles north of Wenden, Arizona, in the foothills of the Harcuvar Mountains, the line will be connected to the Harcuvar Substation (Figures 7 and 12). From this substation, (Figure 6) the line will traverse the McMullen Valley and cross the Hassayampa Plain paralleling the existing 161-kV Parker-Phoenix No. 2 line until it meets the 345-kV Mead-Liberty line.

At this point the line crosses over the 161-kV Parker-Phoenix No. 2 line and parallels it for 18 miles on the south side on double circuit structures along with the 115-kV Liberty-Hassayampa Pumping Plant line. When the alinement meets the 345-kV Mead-Liberty line approximately 1 mile northwest of Liberty Substation, the alinement continues into Liberty Substation paralleling the 345-kV line on the south side, utilizing double-circuit structures. The last 2 miles of this alinement will cross irrigated farmland.

Approximately 100 miles of this line from Parker Dam will use towers that were described in Section I.D.3.d. The last 19 miles to Liberty Substation of the Liberty-Harcuvar portion of the transmission line will be of the double-circuit-type construction with an average span of 800 feet between towers. This type of tower, as shown in Figure 25, will be the free-standing, lattice-steel type, ranging in height from 102 to 152 feet, depending on the terrain. The Liberty-Parker line will be carried on one side of the towers in a vertical configuration and the 115-kV Liberty-Hassayampa line will be carried on the other side in a vertical configuration. Two insulated overhead ground wires will be installed on top of the towers.

The routing of this portion of the transmission system was selected because it will: (1) utilize an established right-of-way for most of its distance; (2) replace a line that has been in service for approximately 40 years and which requires a great amount of maintenance; and (3) allow use of existing access roads for construction and maintenance.

e. Radial Transmission and Check Structure Distribution Lines [3]

The locations of the pumping plants can be identified on Figures 1, 2, 5, 6 and 7. The power for each of these plants will be delivered through radial transmission lines from the nearest substation on the interconnected 230-kV backbone delivery system as shown on Figures 5, 6, and 7. Power to the majority of the check structures located at intervals of 6 to 10 miles will be delivered by buried cable from the pumping plants.

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The Bouse Hills and Little Harquahala Pumping Plants will receive power from Harcuvar Substation via radial 115-kV wood-pole or steel-structure type transmission lines. If wood-pole structures are used, they may be of the two-pole, "H-Frame" type similar to those shown in Figure 26 or of the one-pole "Wishbone" type structure as shown in Figure 27. Wood poles will be treated to prevent deterioration from weathering effects, and will be a of color to be compatible with the natural color of the area traversed by the transmission lines. If steel-type structures are used, they may be of the types shown in Figures 28, 29, or 30. Each of the three phase conductors will be one ACSR (aluminum conductor, steel reinforced). The phase conductors will be supported by suspension insulators attached to the crossarms of the structures. Two insulated 3/8-inch overhead ground wires will be installed near the tops of the poles, except for those types of structures shown in Figures 27 and 28 where only one overhead wire will be installed.

(1) Parker Dam Switchyard to Havasu Pumping Plant 1, 2, 126

A 230-kV radial transmission line (Figure 5) will supply power to the pumps at the Havasu Pumping Plant and will be 2.2 miles long.

The route will begin at the Parker Dam 230-kV Switchyard in California, cross the river below Parker Dam, and parallel a portion of the Bureau of Reclamation's existing 69-kV line between Parker Dam, California and Bagdad, Arizona. For 1.6 miles, the conventional lattice-steel, free-standing towers will be used similar to those that will be used on the main backbone 230-kV system (Figure 14).

Since the pumping plant is adjacent to Arizona State Route 95 and Lake Havasu, the remainder of the line will consist of 0.6 mile of underground cable. For the transition from overhead carrier to underground, a cable spreading yard will be constructed southwest of the pumping plant in an area which is screened by natural landforms. The area will be occupied by pothead and takeoff structures as well as grounding switches and lightning arresters. The underground cables will utilize the most feasible technology available at the time they are installed. Cables with extruded insulation are now under development and may offer cost and installation advantages over oil or gas types by the time the Havasu cables are needed. Two underground circuits will be required to prevent an extended outage should a cable fail. Each circuit will be in a separate trench. By using underground cable for this short distance, the esthetic impact on travelers of Highway 95 and boaters on Lake Havasu from the use of overhead conductors and towers will be minimized.

(2) Harcuvar Substation to Bouse Hills Pumping Plant

The remote location of the Bouse Hills Pumping Plant near Cunningham Wash makes it possible to screen from sight approximately

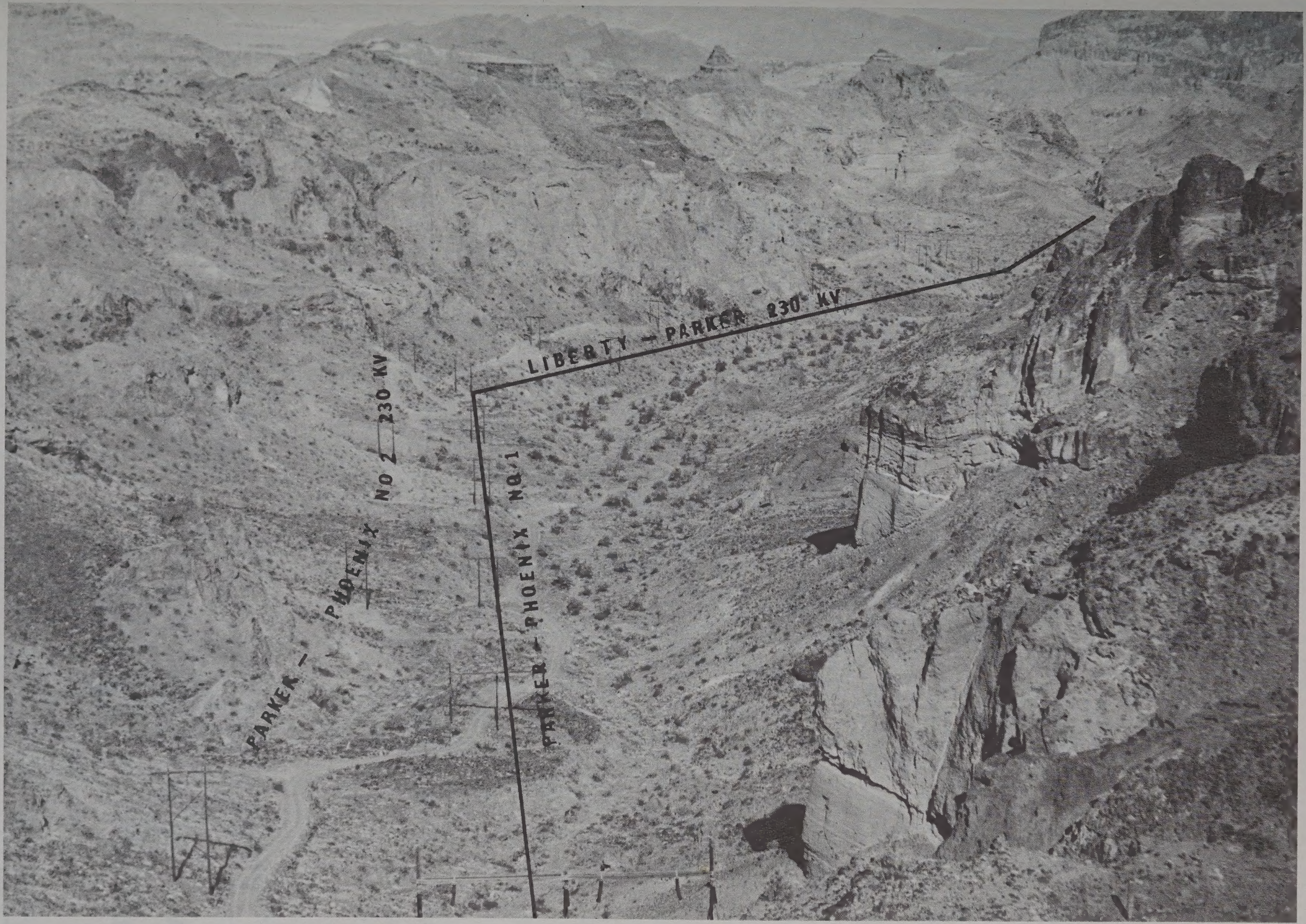
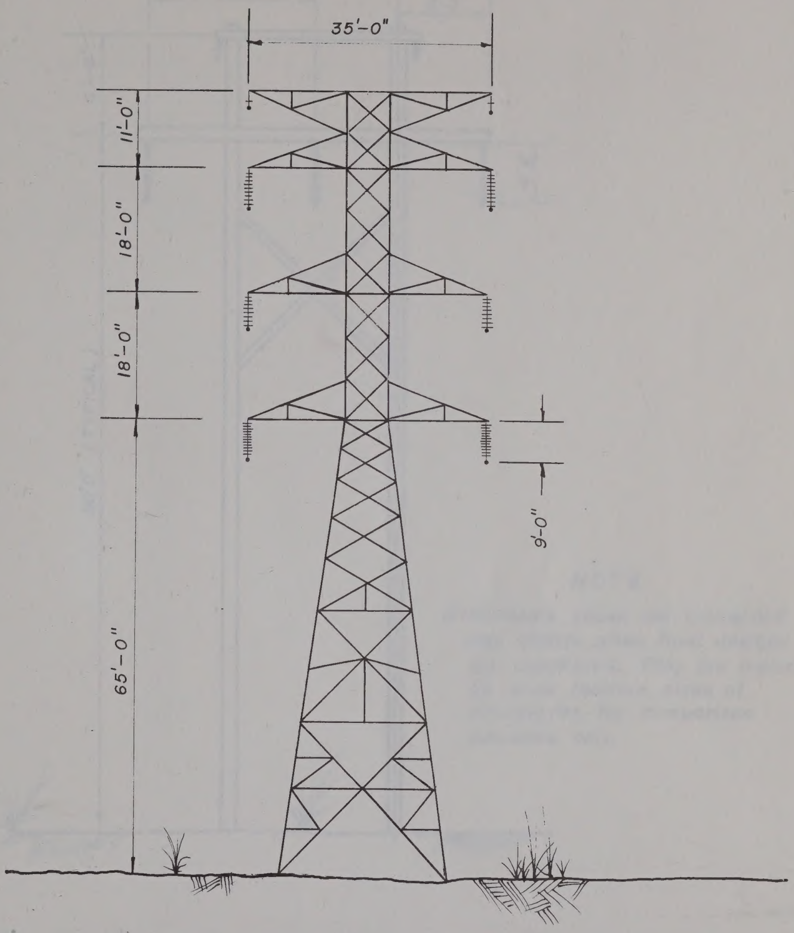


Figure 24. Buckskin Mountains--View northwest showing the transmission system alinement. Sparse vegetation is principally creosote bush, scattered paloverde, and ocotillo. Parallel to the Parker-Phoenix 161-kV No. 2 Line--Liberty-Parker 230-kV Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01151NA.



NOTE

Dimensions shown are typical and may change when final designs are completed. They are indicated to show relative sizes of structures for comparison purposes only.

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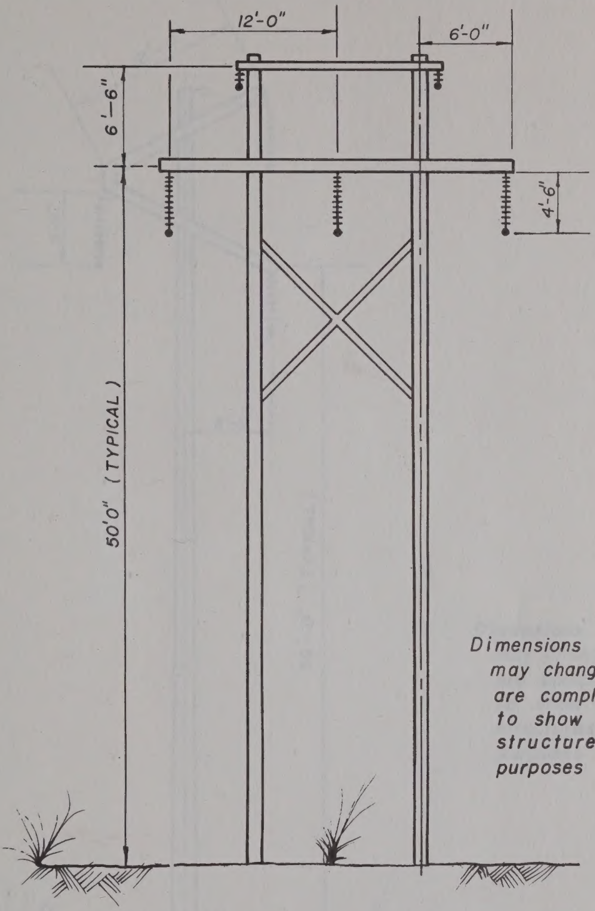
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

230KV TRANSMISSION LINE
DOUBLE CIRCUIT
VERTICAL CONFIGURATION
STEEL LATTICE STRUCTURE

DRAWN Bill Fogo SUBMITTED
TRACED RECOMMENDED
CHECKED APPROVED

PHOENIX, ARIZONA MAY, 1974 344-330-T-289

Figure 25



NOTE

Dimensions shown are typical and may change when final designs are completed. They are indicated to show relative sizes of structures for comparison purposes only.

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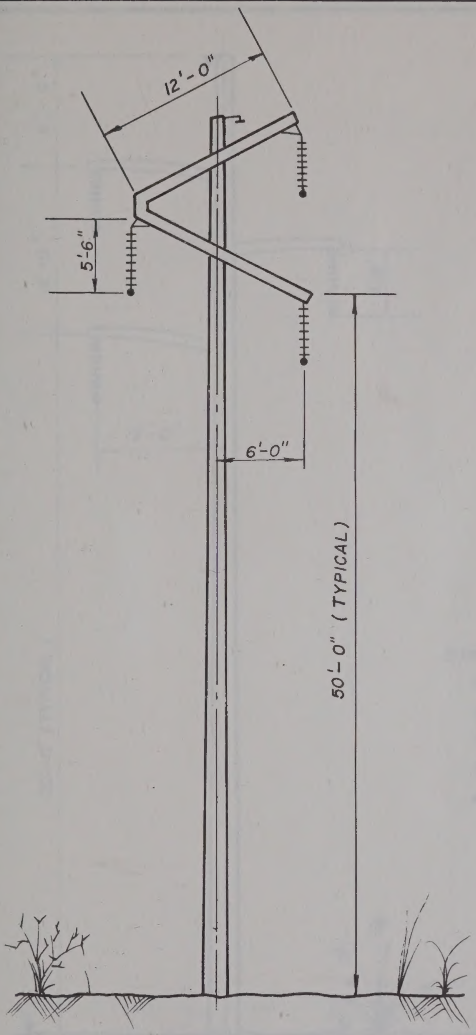
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

115 KV TRANSMISSION LINE
SINGLE CIRCUIT—H-FRAME
WOOD POLE STRUCTURE

DRAWN Bill Hogan SUBMITTED
TRACED RECOMMENDED
CHECKED APPROVED
PHOENIX, ARIZONA MAY, 1974 344-330-T-290

Figure 26



NOTE

Dimensions shown are typical and may change when final designs are completed. They are indicated to show relative sizes of structures for comparison purposes only.

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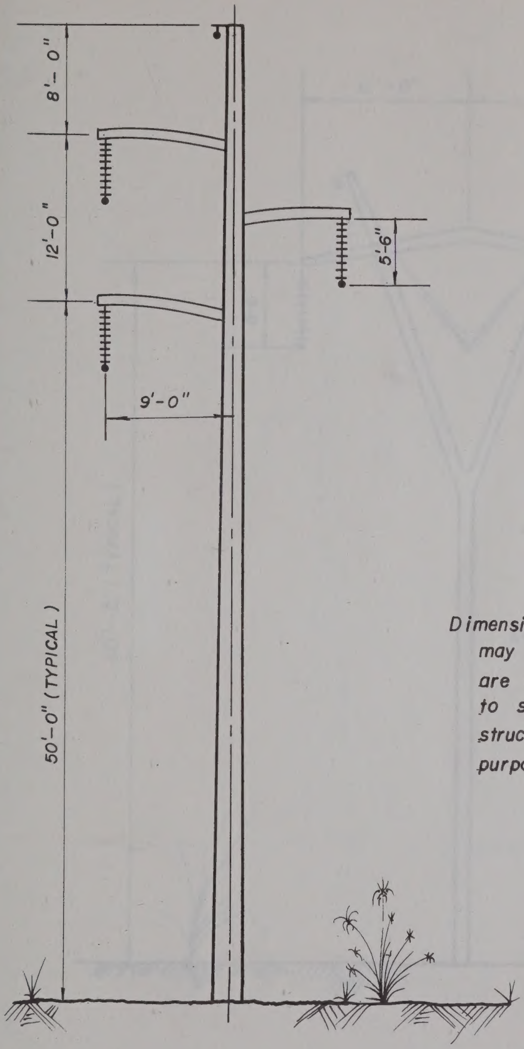
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

115 KV TRANSMISSION LINE
SINGLE CIRCUIT
WISHBONE WOOD POLE STRUCTURE

DRAWN Bill Fago SUBMITTED ________
TRACED ________ RECOMMENDED ________
CHECKED ________ APPROVED ________

PHOENIX, ARIZONA MAY, 1974 344-330-T-297

Figure 27



NOTE

Dimensions shown are typical and may change when final designs are completed. . They are indicated to show relative sizes of structures for comparison purposes only.

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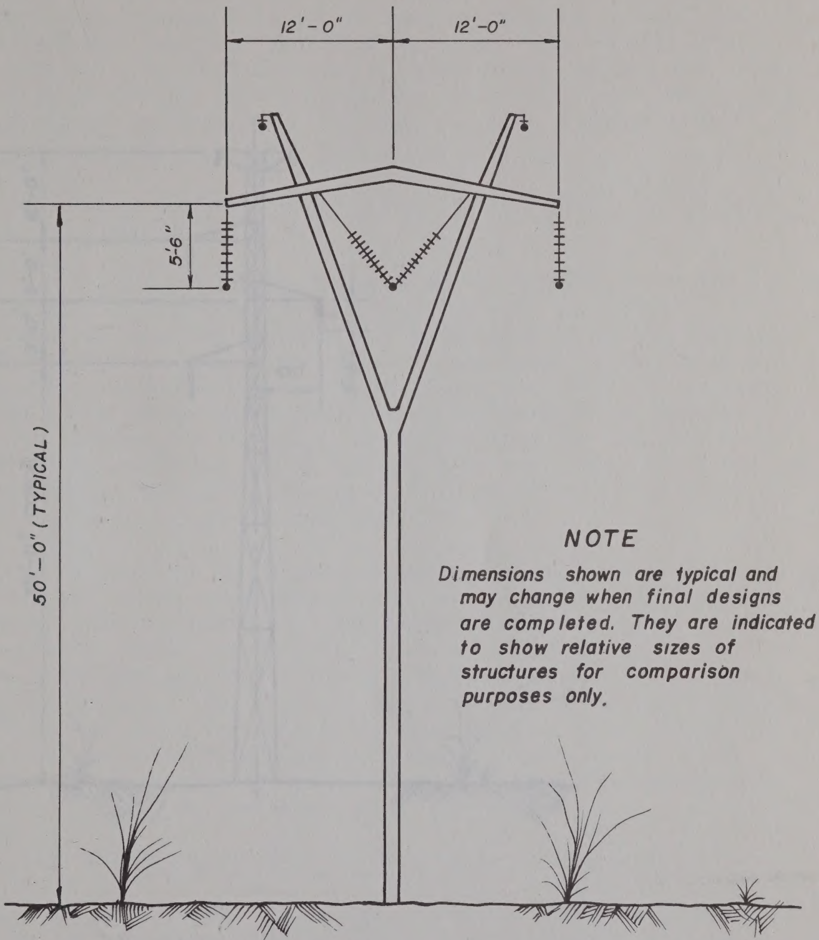
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

115 KV TRANSMISSION LINE
SINGLE CIRCUIT
TUBULAR STEEL STRUCTURE

DRAWN Bill Hogan SUBMITTED
TRACED RECOMMENDED
CHECKED APPROVED

PHOENIX , ARIZONA MAY, 1974 344-330-T-291

Figure 28



NOTE

Dimensions shown are typical and may change when final designs are completed. They are indicated to show relative sizes of structures for comparison purposes only.

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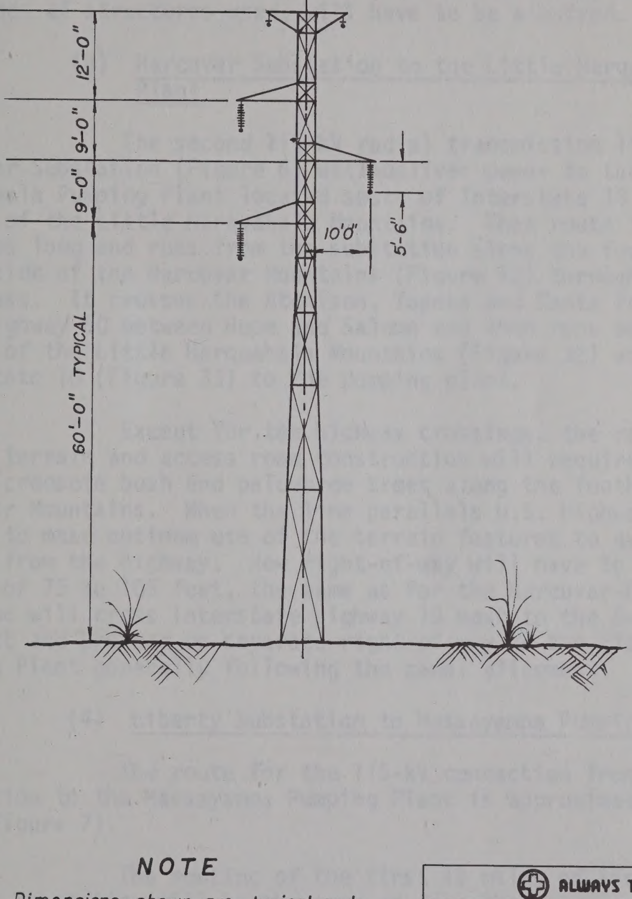
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

115 KV TRANSMISSION LINE
SINGLE CIRCUIT-SLINGSHOT
TUBULAR STEEL STRUCTURE

DRAWN ______ SUBMITTED ______
TRACED ______ RECOMMENDED ______
CHECKED ______ APPROVED ______

PHOENIX, ARIZONA MAY, 1974 344-330-T-292

Figure 29



NOTE

Dimensions shown are typical and may change when final designs are completed. They are indicated to show relative sizes of structures for comparison purposes only.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

115 KV TRANSMISSION LINE
SINGLE CIRCUIT-NARROW BASE
STEEL LATTICE STRUCTURE

DRAWN Bill Hogan SUBMITTED
TRACED RECOMMENDED
CHECKED APPROVED

PHOENIX, ARIZONA MAY, 1974 344-330-T-293

Figure 30

22.6 miles of radial transmission line from any public highway. The first 6.3 miles of the line northwest of Harcuvar Substation will parallel the Parker-Phoenix 161-kV line and the existing access road will be utilized for construction and maintenance. The remaining 16.3 miles will be in an isolated area of desert terrain (Figures 7 and 31) and will require minor clearing for the construction of a new access road. New right-of-way from 75 to 105 feet in width, depending on the types of structures used, will have to be acquired.

(3) Harcuvar Substation to the Little Harquahala Pumping Plant

The second 115-kV radial transmission line from the Harcuvar Substation (Figure 6) will deliver power to the Little Harquahala Pumping Plant located south of Interstate 10 on the southwest slopes of the Little Harquahala Mountains. This route is approximately 26 miles long and runs from the substation along the foothills on the south side of the Harcuvar Mountains (Figure 12) through the Granite Wash Pass. It crosses the Atchison, Topeka and Santa Fe Railroad and U.S. Highway 60 between Hope and Salome and then runs south along the west slopes of the Little Harquahala Mountains (Figure 32) and then across Interstate 10 (Figure 33) to the pumping plant.

Except for the highway crossings, the route is in isolated desert terrain and access road construction will require some clearing of cacti, creosote bush and paloverde trees along the foothills of the Harcuvar Mountains. When the line parallels U.S. Highway 60, it will be routed to make optimum use of the terrain features to avoid high visual impact from the highway. New right-of-way will have to be acquired with widths of 75 to 105 feet, the same as for the Harcuvar-Bouse Hills line. The line will cross Interstate Highway 10 next to the Granite Reef Aqueduct and proceed on separate right-of-way to the Little Harquahala Pumping Plant generally following the canal alinement.

(4) Liberty Substation to Hassayampa Pumping Plant

The route for the 115-kV connection from the Liberty Substation to the Hassayampa Pumping Plant is approximately 25.5 miles long (Figure 7).

The routing of the first 19 miles of line northwest of Liberty Substation will be the same as described previously for the first 19 miles of the Liberty-Parker 230-kV line since both lines utilize the same double circuit towers for this portion of line. At the point where the double circuit line meets the 345-kV Mead-Liberty line and the existing but to be replaced 161-kV Parker-Phoenix No. 1 line right-of-way, the 115-kV Liberty-Hassayampa line becomes a single circuit line and crosses under the Parker-Phoenix No. 2 line and Mead-Liberty line and proceeds to Hassayampa Pumping Plant. The last 6.5 miles of this line will be single circuit and routed as shown in Figure 6. The first 4.2 miles of single circuit line will cross native desert while the last 2.3 miles will follow the canal maintenance road on the aqueduct right-of-way. Figures 34 and 35 show the possible structure arrangement in relationship with the aqueduct and maintenance road.

(5) Check Structure Distribution Lines [3]

Check structures will be installed at 6- to 10-mile intervals along the aqueduct. Power to the structures will be provided by either 34.5-kV or 13.8-kV buried cables placed along the canal approximately 5 feet under the operation and maintenance road. The feeder cables will terminate at the Bouse Hills, Little Harquahala, and Hassayampa Pumping Plants. An automated standby power source of either a motor-generator set or a battery bank will be provided at each check structure for use in the event of an emergency. These will be located inside a small control building at each check structure. Existing distribution lines will be utilized in the more populated areas where they presently exist although the feeders to the check structures will be buried from the point where they tap an existing overhead line to the check structure.

4. Construction Schedule

Initial construction of the integrated transmission system is expected to start in mid-1975 and take 10 years to complete. The following construction sequence is presently proposed in constructing the transmission system:

	Inservice Date
1. Davis-Parker 230-kV No. 2 Line	May 1, 1977
2. Liberty-Harcuvar-Parker 230-kV Line	July 1, 1979
3. Mead-Davis 230-kV No. 2 Line	January 1, 1981
4. McCullough 230-kV Interconnection	January 1, 1982
5. Parker-Havasu Pumping Plant 230-kV Line	January 1, 1983
6. Liberty-Hassayampa Pumping Plant 115-kV Line	January 1, 1983
7. Harcuvar-Bouse Hills Pumping Plant 115-kV Line	January 1, 1983
8. Harcuvar-Little Harquahala Pumping Plant 115-kV Line	January 1, 1983

Substation and switchyard additions along with the new Harcuvar Substation will be constructed along with their appropriate transmission lines. As the power system will be integrated with USBR facilities which are already constructed, the above construction sequence will allow the new lines to be built with a minimum of power interruptions. Also, each line will be placed in service upon its completion so as to add to the reliability of the existing system even though it will not be required to feed CAP loads until completion of the Granite Reef Aqueduct, tentatively scheduled for 1985.

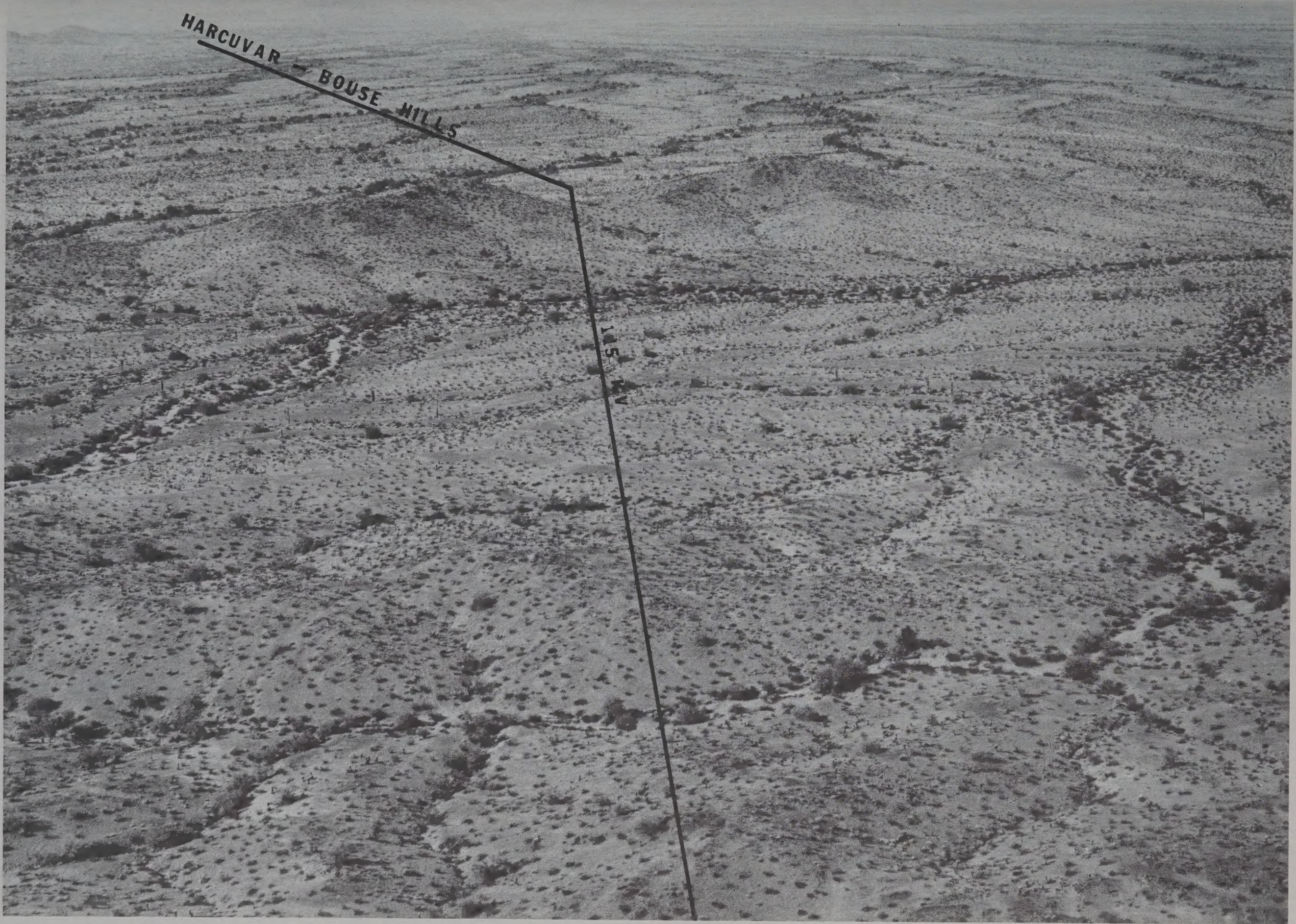


Figure 31. Bouse Hills 115-kV Alinement--View to the west showing the transmission system alinement in a creosote, paloverde, and cholla vegetation community--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01183NA.

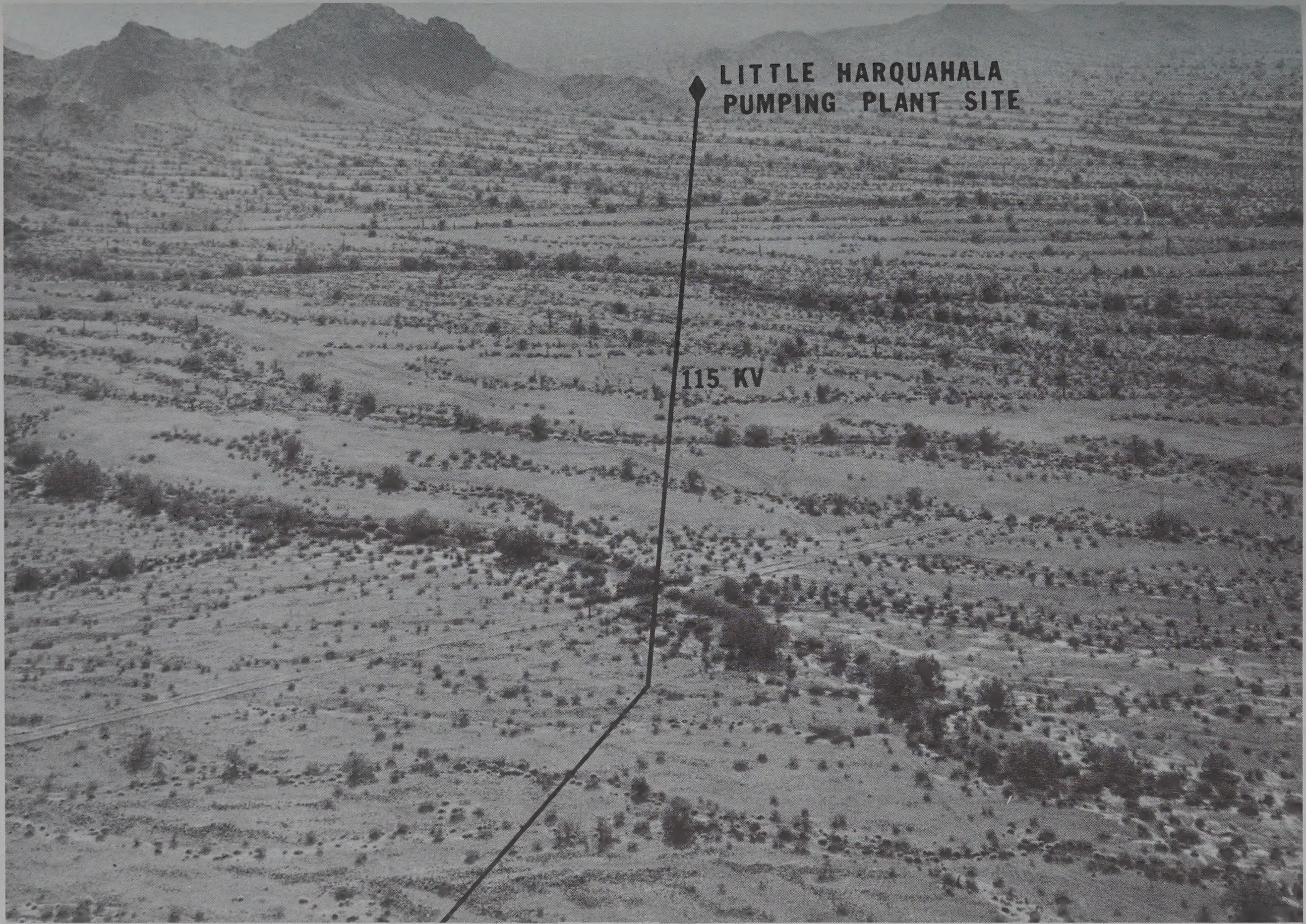


Figure 32. Little Harquahala Mountain Pumping Plant Site--View southeast showing the transmission system alinement in a creosote-bursage community with paloverde along the washes--Harcuvar-Little Harquahala Mountains 115-kV--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01176NA.

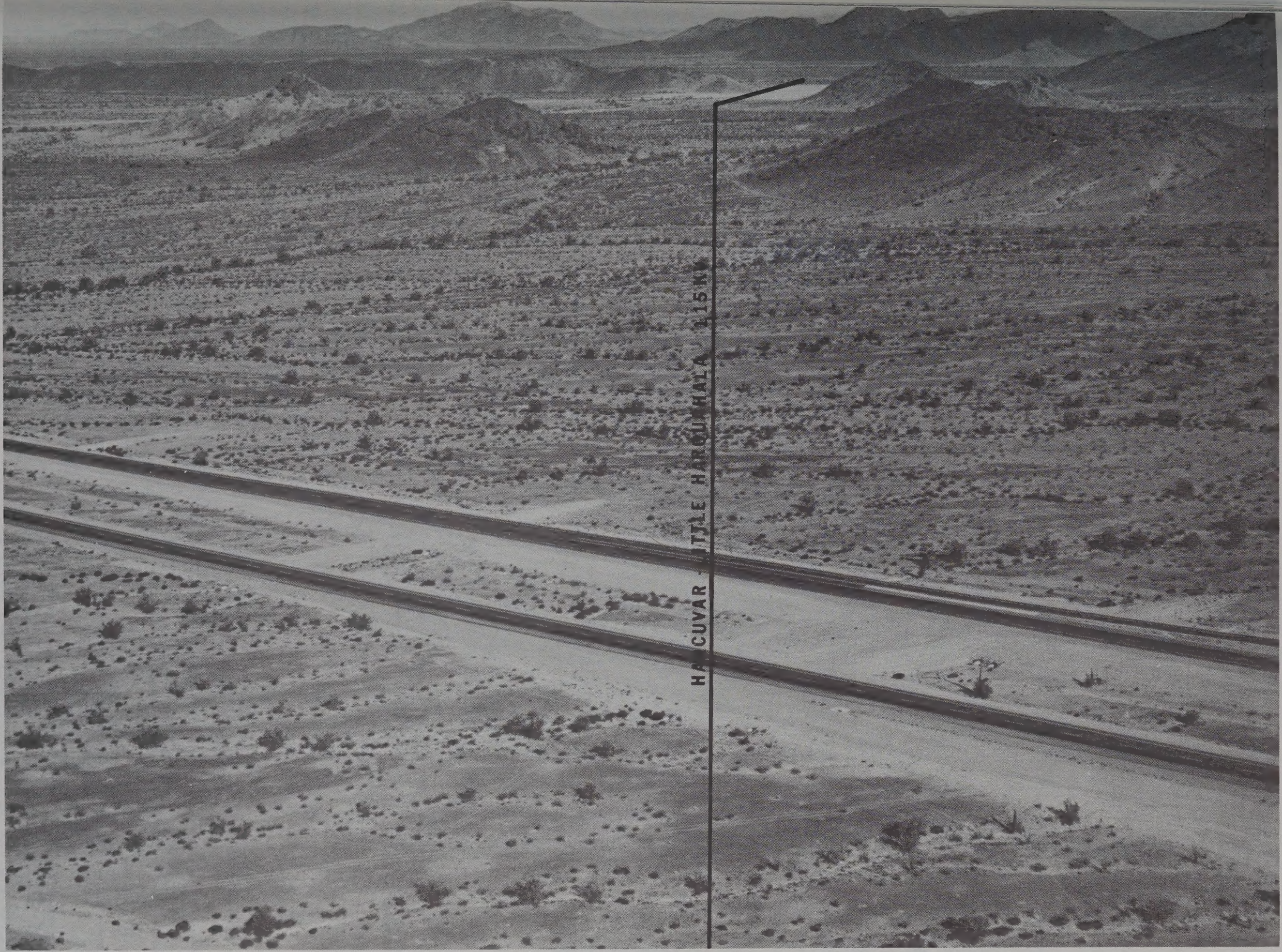
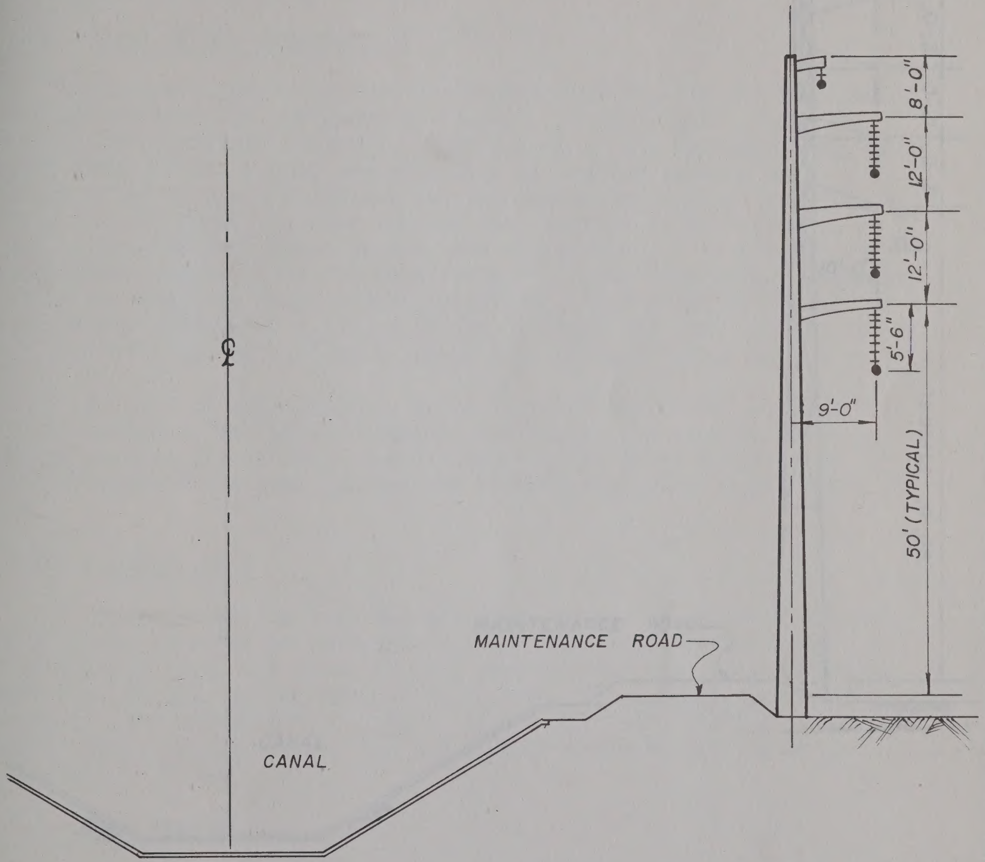


Figure 33. I-10 Crossing--115-kV Harcuvar-Little Harquahala Mountains Pumping Plant radial transmission line alinement through the Little Harquahala Mountains--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01175NA.



NOTE

Dimensions shown are typical and may change when final designs are completed. They are indicated to show relative sizes of structures for comparison purposes only.

This design may be used for approximately two miles on 115 KV Liberty—Hassayampa line.

1—4—75 330 F.W.	MINOR CHANGES

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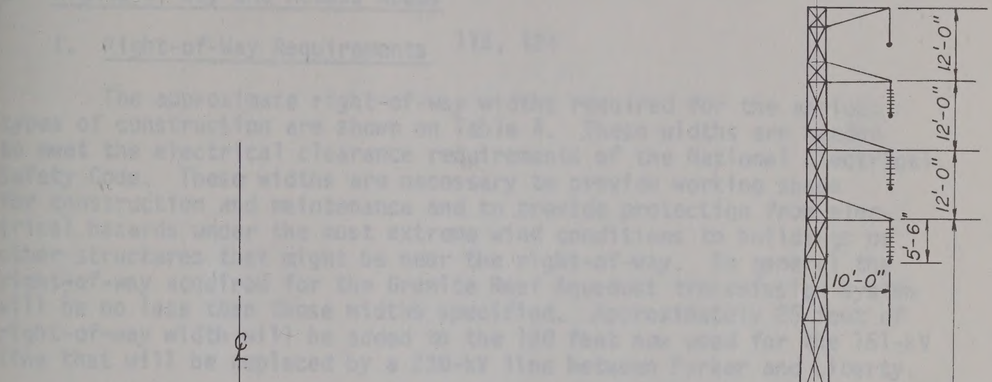
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
115 KV TRANSMISSION LINE
SINGLE CIRCUIT
TUBULAR STEEL STRUCTURE

DRAWN Bil Hogan SUBMITTED F. J. Weiss
TRACED ________ RECOMMENDED
CHECKED ________ APPROVED C.A. Pugh

PHOENIX, ARIZONA MAY, 1974 344-330-T-294

Figure 34



NOTES

Dimensions shown are typical and may change when final designs are completed. They are indicated to show relative sizes of structures for comparison purposes only. This design may be used for approximately two miles on 115KV Liberty – Hassayampa line.

1–4–75 330 F	MINOR CHANGE

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

115 KV TRANSMISSION LINE
SINGLE CIRCUIT–NARROW BASE
STEEL LATTICE STRUCTURE

DESIGNED__________ SUBMITTED__________
DRAWN Bill Hogan RECOMMENDED__________
CHECKED__________ APPROVED__________

PHOENIX, ARIZONA MAY, 1974 **344-330-T-298**

Figure 35

The scheduling for construction of the transmission system is subject to change and adjustment depending on Congressional appropriations of construction funds and unforeseen delays. The length of each construction contract will vary from a 1- to 2-year period for the individual substations and switchyards and to about 3 years for the individual transmission lines.

E. Rights-of-Way and Access Roads

1. Right-of-Way Requirements [113, 124]

The approximate right-of-way widths required for the various types of construction are shown on Table 4. These widths are needed to meet the electrical clearance requirements of the National Electrical Safety Code. These widths are necessary to provide working space for construction and maintenance and to provide protection from electrical hazards under the most extreme wind conditions to buildings or other structures that might be near the right-of-way. In general the right-of-way acquired for the Granite Reef Aqueduct transmission system will be no less than those widths specified. Approximately 25 feet of right-of-way width will be added to the 100 feet now used for the 161-kV line that will be replaced by a 230-kV line between Parker and Liberty.

A total of approximately 4,116 acres of additional right-of-way will be required, including roadways, the substation site at Harcuvar and the transmission lines. Approximately 1,235 acres of existing right-of-way will be used for the new 230-kV Liberty-Harcuvar-Parker line.

2. Landownership

Ownership of the land for the right-of-way in addition to lands for existing lines to be replaced includes approximately 285 acres of Arizona State land, 409 acres of land reserved for the State of Nevada under P.L. 85-339, as amended,but still under the jurisdiction of the Bureau of Land Management, 463 acres of private land, and 2,959 acres of Federal land. Landownership for the various segments of line is as shown on Table 5.

3. Land Acquisition

Land required for the proposed transmission line right-of-way is expected to be acquired in the form of a perpetual easement except for those lands optioned to the State of Nevada. The landowner will grant to the United States, its successors and assigns a perpetual easement to construct, reconstruct, operate, and maintain the transmission line across the right-of-way. The landowner is paid just compensation based upon an appraisal or negotiated settlement satisfactory to both parties. When a satisfactory settlement cannot be secured through negotiations, condemnation action may be necessary. The same procedure will be used

Table 4
Required Right-of-Way Widths

Type of Transmission Line Construction	Ruling Span (feet)	ROW Width (feet)
Double-Circuit with 230-kV on One Side and 115-kV on Other Side	1,200	120
230-kV Single-Circuit	1,300	155
115-kV H-Frame Wood	700	75
115-kV Single-Pole or Single-Mast Type with Two Conductors on One Side and One Conductor on Other Side	700 1,000 1,200	70 85 105
Same as Above Except All Conductors on One Side	700 1,000 1,200	50 65 85
230-kV guyed Delta Tower (Pole or Lattice) 1/	1,300	155

1/ Alternative Style Tower Design, but not proposed for use on this project.

Table 5
Transmission Line Lengths and Land Status (Miles)

Line	Federal	Federal Recreation	State Recreation	State (Arizona)	State (Nevada)	Private	Total
McCullough - Mead	4.8	--	--	--	10.5	--	15.3
Mead - Davis	54.0	2.0	--	--	11.3	1.0	68.3
Davis - Parker	46.5	--	4.0 1/	6.5	--	14.0	71.0
Parker - Harcuvar - Liberty	79.4	--	--	25.1	--	16.4	120.9
Parker - Havasu Pumping Plant	2.2	--	--	--	--	--	2.2
Harcuvar - Bouse Hills Pumping Plant	16.9	--	--	4.0	--	1.7	22.6
Harcuvar - Little Harquahala Pumping Plant	24.6	--	--	2.2	--	--	26.8
Liberty - Hassayampa Pumping Plant	5.2 2/	--	--	1.3	--	--	6.5
TOTALS	233.6	2.0	4.0	39.1	21.8	33.1	333.6

1/ The 4.0 mile of State Recreation Land is Reclamation withdrawn land by the Arizona State Parks Board.

2/ Liberty-Hassayampa line is double circuit for 19.0 miles and not included here since it is included under the Parker-Harcuvar-Liberty line.

for acquiring access road easements for construction, and operation and maintenance that are off the transmission line right-of-way. Access to transmission line right-of-way for project-related activities will be on existing roads, wherever possible.

Easements will be acquired through State-owned lands by the same procedures as used on privately owned lands.

Right-of-way through Federal lands will be acquired through coordination with the appropriate administering agency.

The land required for the proposed Harcuvar Substation is Federally owned and a withdrawal application for the required 10 acres will be made through the Bureau of Land Management.

4. Land Use 33, 132, 133

The present use of the land that will be occupied by the transmission line route between McCullough Switching Station in Nevada and the Liberty Substation near Phoenix, Arizona, is as varied as the land through which the line passes. The route has been planned, however, to minimize any permanent effects on this use and will in some instances enhance the utilization.

The McCullough-Mead and Mead-Davis lines will cross land in Eldorado Valley (Nevada), presently under the administration of BLM, but reserved under Public Law 85-339 as amended to the State of Nevada. The State has not exercised its option to buy this land, as a revised plan of development is being prepared. Close coordination is being maintained with the State to assure that the routing of these lines will be compatible with its plan.

The Mead-Davis line will cross the right-of-way used by the Southwest Gas Corporation and parallel it for about 16 miles in Nevada. Mine access roads will be crossed near Searchlight, Nevada. The route will have no restrictions or infringements upon these uses.

The right-of-way for the Mead-Davis line will run just inside the southern boundary of the Lake Mead National Recreation Area for 2 miles on the Nevada side of the Colorado River. Itwill then run northeast for an additional mile outside of the Recreation Area to Davis Dam. The present land use and access restrictions on recreation now imposed by the National Park Service will not change as a result of the transmission line.

Between the Davis Dam Switchyard and the Parker Dam Switchyard, the line will follow a course that is generally parallel to the Arizona side of Lake Havasu. This portion crosses the rights-of-way of underground users including American Telephone and Telegraph, Black Mesa Pipeline, Inc., Four Corners Pipeline Company, Transwestern Pipeline Company and El Paso Natural Gas Company.

Overhead powerlines that will be crossed by the proposed transmission lines are owned by the Citizens Utilities Company, Southern California Edison Company, Metropolitan Water District of Southern California, Arizona Public Service Company, Nevada Power Company, and City of Los Angeles Department of Water and Power.

Between Parker Dam and Lake Havasu City, a right-of-way strip 6,000 feet long and 155 feet wide will be required through the Lake Havasu Travel Trailer Village and the line will cross 4 miles of the Lake Havasu State Park. The State Park is Federal land administered by the State of Arizona for recreation purposes and is subject to Reclamation project requirements.

Primarily, the land between the Parker Switchyard and the Liberty Substation that the route will occupy is used for recreation and cattle grazing. The line will cross a portion of a mobile home residential area near Parker Dam (Figure 36) on the same right-of-way now used by the 161-kV line that will be replaced.

At the eastern end of the transmission line system, near Liberty Substation, the alinement parallels other existing lines through approximately 2 miles of irrigated agricultural land. Land use for agricultural purposes affected by the tower construction will vary from the total area within the perimeter formed by the tower legs of about 1,600 square feet, to the area occupied by the leg footings of about 20 square feet each, depending on the cropping pattern and farm practices.

The transmission lines will make several crossings over State and U.S. highways. At these locations, no change in the use of roadways will be made except possibly for some unforeseen minor delays to the highway users during the time of the crossing construction.

The private landowner will have the right to cultivate, use and occupy the acquired right-of-way for any purposes which will not constitute a hazard to human life or interfere with the rights and privileges granted to the United States. Compatible use of the right-of-way through Federal lands will be at the discretion of the administering land-use agency.

The Bureau of Reclamation is responsible for damage occurring to crops or other necessary improvements within the right-of-way as a result of construction and operation and maintenance of the transmission line.

5. Access Roads

Existing access roads will be used wherever new lines utilize existing right-of-way or parallel existing transmission lines. Short spur roads may be required to tower sites for construction purposes.

New access roads will be required for those lines that do not parallel existing lines, such as the 115-kV and 230-kV lines to the pumping plants and where the Davis-Parker 230-kV line is routed around Lake Havasu City. Access roads will also have to be constructed for minor portions of the Liberty-Parker 230-kV line and the Mead-Davis 230-kV line where they deviate from paralleling existing lines or access is impossible from the existing access roads because of terrain features. These roads will not only be used for construction but may also be used throughout the life of the transmission lines for operation and maintenance activities. There will be approximately 70 miles of new access road required for the complete integrated transmission system additions covered in this report. Approximately 265 miles of existing access roads will be utilized.

Access roads will be routed to minimize damage to existing terrain and vegetation. Where the roads cross dry wash beds they will be constructed as fords unless culverts are required for drainage purposes.

The access road grades and alinements will follow the contour of the land with smooth, gradual curves when possible in order to reduce erosion and sedimentation. Where drainage problems are evident, the roads will be improved by providing side drainage ditches and culverts if necessary. After construction activities, the access roads will be repaired for maintenance use or, if not needed for maintenance, will be allowed to return to a natural state after obliteration.

F. Operation and Maintenance 1-3, 25, 29, 34, 39

The Granite Reef Aqueduct power transmission system will be integrated into the Federal power system. Primarily, it connects the Navajo Generating Station delivery points to the pumping plants and other loads associated with the aqueduct system. It is anticipated that the Parker-Davis Project (Bureau of Reclamation), which operates the existing Federal transmission system, will regulate the power requirements of the Granite Reef Aqueduct through coordination with computerized control systems controlling the water aspects of the aqueduct.

Operating procedures for the Granite Reef Aqueduct will be established to optimize the revenues from intermittent power sales. This can best be done by pumping water during offpeak periods so that power is available for sale during peak periods. It has been assumed that determinations of annual quantities of water available for diversion to CAP can be reasonably made several years in advance, and that water will be diverted at a uniform rate throughout the year subject to water and power system maintenance and interruptions.

Typical summer operation of the Granite Reef Aqueduct will be 102 hours per week at rated capacity and 66 hours per week at a reduced capacity to

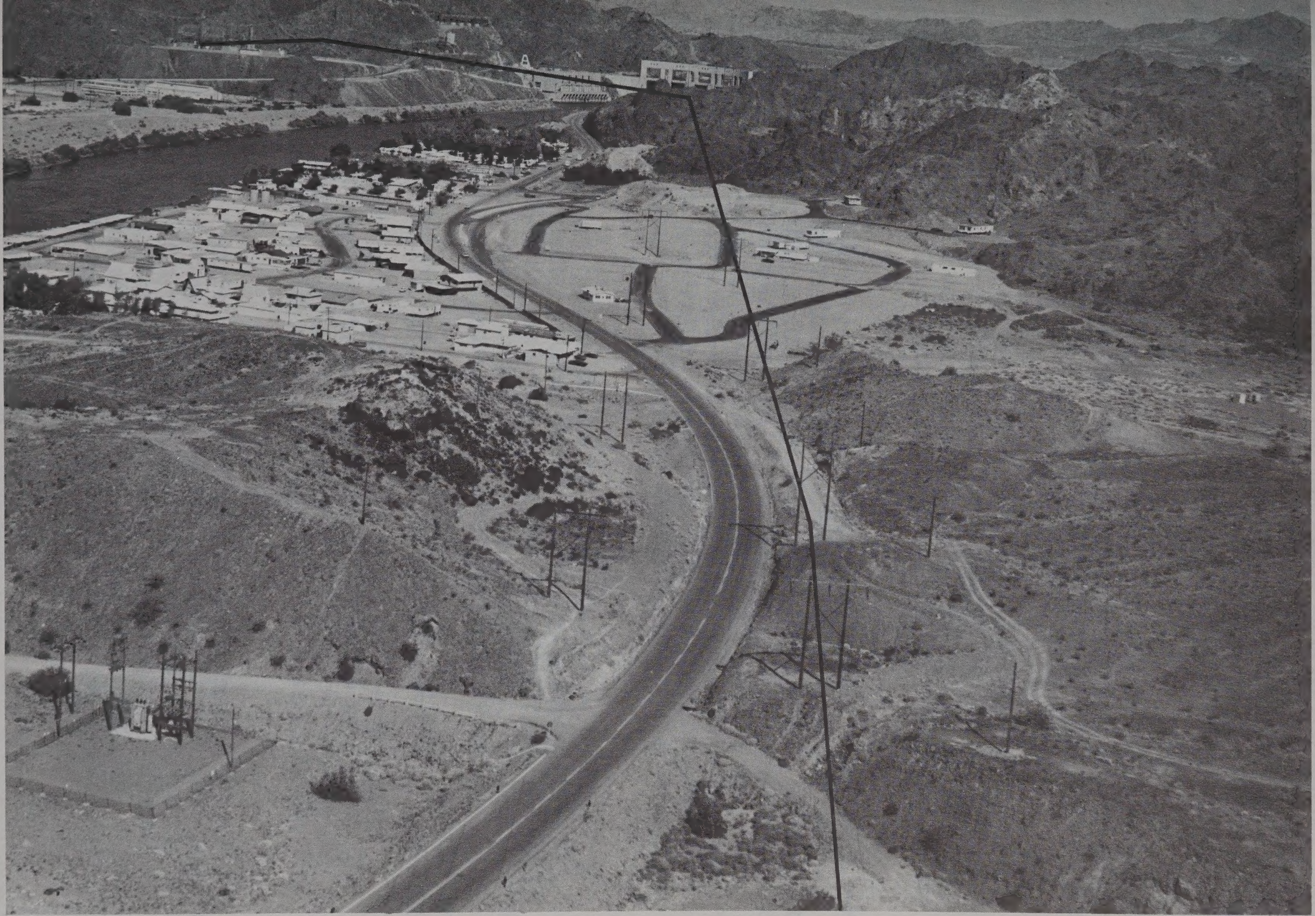


Figure 36. Parker Dam--View northwest ot the transmission system alinement through a mobile home residential area south of Parker Dam on Arizona Highway 95. Parker Dam in upper center area--Liberty-Parker 230-kV Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01157NA.

be fixed by water availability and the master delivery schedule. Typical winter operation of the Granite Reef Aqueduct will be 102 hours per week at approximately two-thirds rated capacity and 66 hours per week at a lesser capacity to be fixed by water availability and the master delivery schedule. Operations may be continuous except for emergencies for as long as 5 or more years.

Under maximum water supply conditions, during years of surplus water, the aqueduct will be operated 168 hours per week throughout the entire year at its rated capacity of 3,000 ft^3/s. Under minimum water supply conditions, all pumping will be accomplished offpeak.

Capacity and energy not required for CAP pumping will be sold as commercial energy to provide funds for repayment of Central Arizona Project costs. The proposed transmission system described herein may be used to deliver such excess capacity and energy to appropriate delivery points.

The operation of the Granite Reef Aqueduct transmission system and the existing transmission system will be performed by Parker-Davis Project personnel on a coordinated basis that will monitor the automated aqueduct operation continuously. Should an adverse situation occur on the aqueduct system or transmission system, steps will be taken to minimize any disturbances which may affect the interconnected power system. The Navajo Project Agreements allow for pump dropping upon loss of a Navajo generating unit to satisfy spinning reserve requirements.

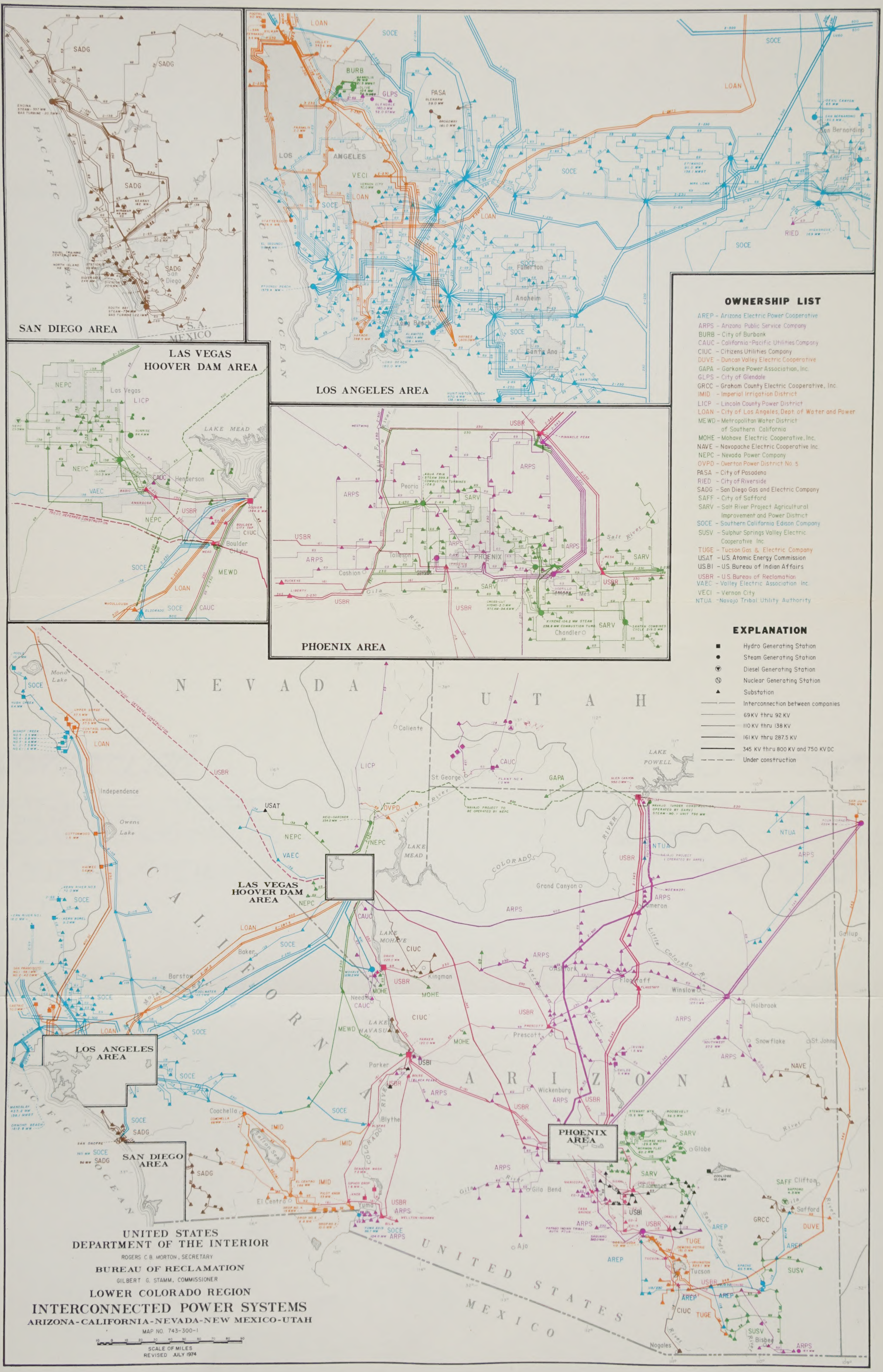
The maintenance of the transmission system will be performed by Parker-Davis Project personnel in the manner and schedule presently employed for the existing system. Monthly surveillance by helicopter of the lines and weekly inspection of the substations will be utilized to determine the type and schedule of maintenance crew work.

G. Interrelationship and Coordination with Other Systems 29, 116, 120, 121, 144-146

The integrating of additional transmission system facilities between McCullough Substation and Liberty Substation will allow the combined systems to (1) serve CAP pumping loads of the Granite Reef Aqueduct system and (2) provide an adequate transmission system for reliability.

The mutual interrelationship of the integrated system for the CAP with the other systems operating in the same area is such that benefits to CAP will result from elimination of duplicate transmission facilities, right-of-way requirements, and operation and maintenance expenses. Other systems such as customers of the Bureau of Reclamation, Parker-Davis Project, and Colorado River Storage Project operating in the area will benefit from a more reliable system operation. This interrelationship is shown on Figure 37.

Power flow and stability studies made to determine the effect of outages and faults on the CAP transmission system indicate no adverse effect on other adjacent systems. The power system remained stable for three-phase line faults at all major line terminals which resulted in disconnecting a line section. Under normal system conditions, the transmission system has sufficient capacity to serve the CAP loads without relying on any other system. This meets the Bureau of Reclamation and Western Systems Coordinating Council design criteria for providing sufficient transmission capacity within the system to serve the loads and meet transmission obligations to others without relying on or imposing an undue degradation of reliability on any other system.



OWNERSHIP LIST

AREP – Arizona Electric Power Cooperative
ARPS – Arizona Public Service Company
BURB – City of Burbank
CAUC – California-Pacific Utilities Company
CIUC – Citizens Utilities Company
DUVE – Duncan Valley Electric Cooperative
GAPA – Garkane Power Association, Inc.
GLPS – City of Glendale
GRCC – Graham County Electric Cooperative, Inc.
IMID – Imperial Irrigation District
LICP – Lincoln County Power District
LOAN – City of Los Angeles, Dept. of Water and Power
MEWD – Metropolitan Water District of Southern California
MOHE – Mohave Electric Cooperative, Inc.
NAVE – Navopache Electric Cooperative Inc.
NEPC – Nevada Power Company
OVPD – Overton Power District No. 5
PASA – City of Pasadena
RIED – City of Riverside
SADG – San Diego Gas and Electric Company
SAFF – City of Safford
SARV – Salt River Project Agricultural Improvement and Power District
SOCE – Southern California Edison Company
SUSV – Sulphur Springs Valley Electric Cooperative Inc.
TUGE – Tucson Gas & Electric Company
USAT – U.S. Atomic Energy Commission
US.BI – U.S. Bureau of Indian Affairs
USBR – U.S. Bureau of Reclamation
VAEC – Valley Electric Association Inc.
VECI – Vernon City
NTUA – Navajo Tribal Utility Authority

EXPLANATION

■	Hydro Generating Station
●	Steam Generating Station
⊽	Diesel Generating Station
Ⓝ	Nuclear Generating Station
▲	Substation
— · —	Interconnection between companies
—	69 KV thru 92 KV
—	110 KV thru 138 KV
—	161 KV thru 287.5 KV
—	345 KV thru 800 KV and 750 KV DC
– – –	Under construction

UNITED STATES
DEPARTMENT OF THE INTERIOR
ROGERS C.B. MORTON, SECRETARY
BUREAU OF RECLAMATION
GILBERT G. STAMM, COMMISSIONER
LOWER COLORADO REGION

INTERCONNECTED POWER SYSTEMS
ARIZONA-CALIFORNIA-NEVADA-NEW MEXICO-UTAH

MAP NO. 743-300-1

10 0 10 20 30 40 50 60 70 80 90
SCALE OF MILES
REVISED JULY 1974

CHAPTER II

DESCRIPTION OF THE ENVIRONMENT

II. DESCRIPTION OF THE ENVIRONMENT

A. General 1-3, 29, 82-99

This chapter describes the environmental setting of the transmission system for the Granite Reef Aqueduct from its beginning at McCullough Switching Station in Nevada to its terminus at Liberty Substation in Arizona, and the radial transmission lines from the substations to the pumping plants. This area lies within the Mohave and Sonoran Desert sections of the Basin and Range Physiographic Province (Figure 38). The environmental factors discussed include climate, topography, soils, geology, vegetation, wildlife, land use, and historical, archeological, sociological, and cultural aspects. The area through which the transmission system will pass has been used by man for his welfare during prehistoric and historic times.

Figures 3 through 7 indicate the more prominent evidence of man's past and continuing presence. It is virtually impossible to find any segment of the transmission system route from which specific evidence of man's presence and use of the area cannot be found within a distance of a few miles. The sounds of man's activities cannot be avoided except for short periods of time at any location along the transmission system.

The Bill Williams River is generally referred to as the division between the Sonoran and Mohave Deserts. The surrounding area is a transitional zone between the deserts. A mixing of the biota occurs in this area.

The Mohave Desert of the northern part of the system is a transitional desert between the cooler Great Basin Desert to the north and the hotter Sonoran Desert to the south. The Mohave Desert is typically a series of unchained basins separated by mountain ranges with broad, gently sloping alluvial plains. The playa portion of the closed basins, the undrained portion of the valley, generally has high salinity and alkalinity in the soil. In the Mohave Desert, the transmission system will traverse the Eldorado and Paiute Valleys and the Mohave and Buckskin Mountain ranges.

Eldorado Valley in the Mohave Desert is a closed basin with no surface drainage outlet, whereas Paiute Valley drains into the Colorado River. Many ephemeral washes in the Mohave Desert drain into the Colorado River. Silver Creek, Standard Wash, and Sacramento Wash are the principal drainages crossed in the Mohave Desert that drain into the Colorado River. These outlets have no surface flow in the area of the transmission system except during infrequent periods of heavy rainfall.

The Sonoran Desert section is located in the southwest portion of Arizona and is the lowest in elevation and the hottest desert in the State. This desert is characterized by a series of mountain chains separated by alluvial valleys with drainage outlets. Significant mountain ranges and valleys along the transmission system include the Buckskin Mountains, Cactus Plain, Butler Valley, Harcuvar Mountains, McMullen Valley, Harquahala Mountains, Hassayampa Plain, White Tank Mountains and Buckeye Plain.

The Sonoran Desert mountains and valleys are drained by numerous ephemeral desert washes and rivers which drain directly into the Colorado or Gila Rivers. These include Osborne, Cunningham, and Bouse Washes and the Bill Williams River which drain in a westerly direction to the Colorado River. Major drainage south to the Gila River system includes Centennial Wash and the Hassayampa River. Those drainages in the vicinity of the transmission system have no surface flow except during infrequent periods of heavy rain.

Elevations along the route of the transmission system vary from a minimum of about 400 feet near Parker Dam to a maximum of about 3,600 feet in an area between the Eldorado and Paiute Valleys near Searchlight, Nevada.

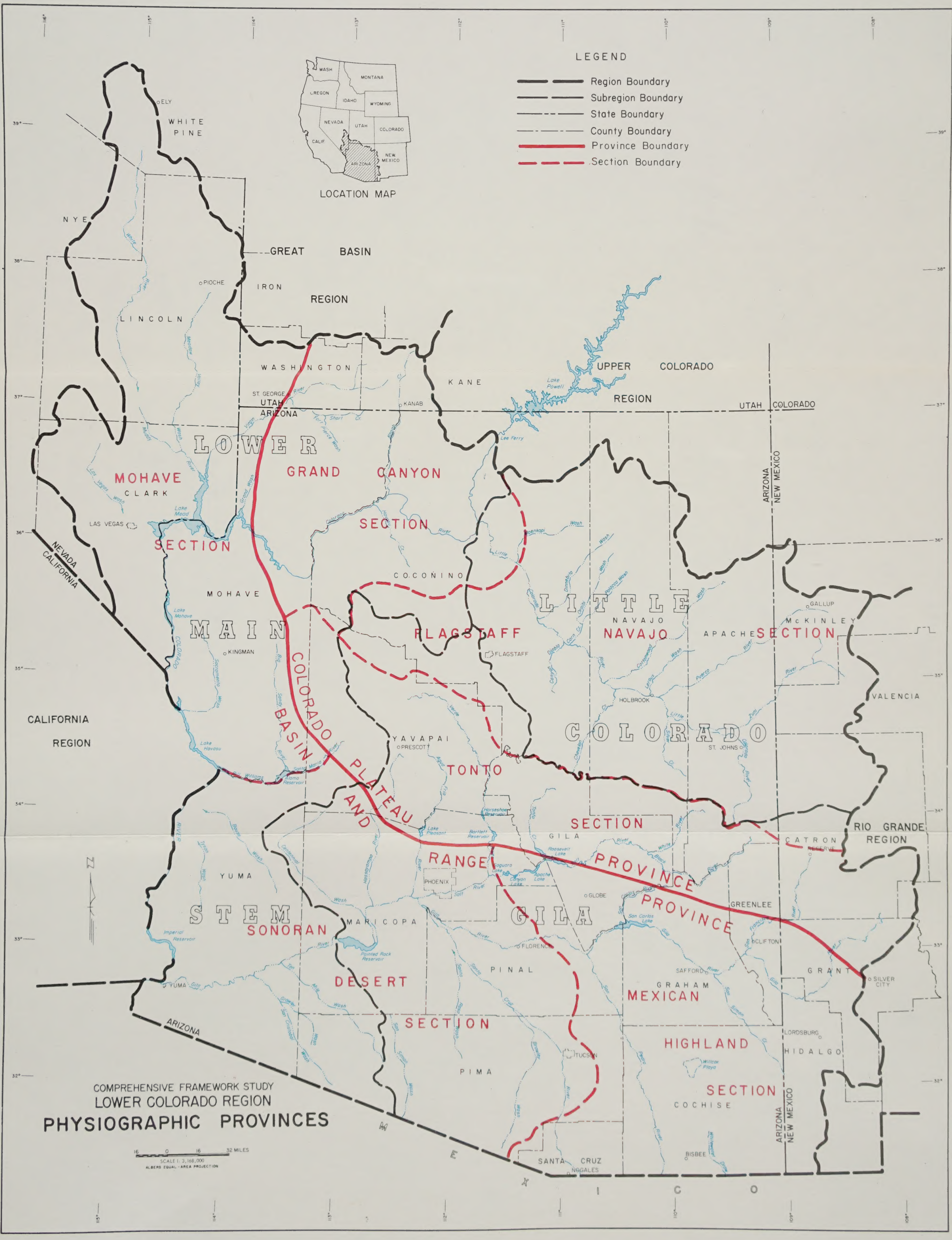
B. Climate 1-3, 30-32, 84, 87, 134

The climate of the area is typical of the deserts of the arid Southwestern United States. It is characterized by long, hot summers, short, mild winters, sparse rainfall, low relative humidity, and high evaporation rates. These conditions promote sparse vegetal cover and poorly defined drainage patterns. Sheet runoff, flash flooding and erosion are typical problems to be encountered at various locations along the transmission system. Table 6 is a summary of climatic data for the area.

Temperatures show little variability at any point in time over the transmission system. There is a difference of about 6 degrees in mean temperature between Boulder City, Nevada, and Buckeye, Arizona (Liberty Substation). During the summer season beginning about mid-May and ending in October, maximum readings of 120°F. have been recorded and readings in excess of 100°F. are common. Winter temperatures in the desert typically reach daily maximums in the mid-60's to 70's. Only occasionally do temperatures drop below freezing but lows of 10° to 15°F. have been recorded throughout the area. Sunshine occurs during about 85 percent of the daylight hours.

The characteristically clear skies and dry atmosphere permit intense surface heating during the day and active radiational cooling at night, resulting in daily temperature variations averaging 30°F. and sometimes exceeding 40°F. The combination of high temperatures and low humidity also produces high rates of evaporation and transpiration.

Precipitation on the Mohave Desert is sparse and originates from the Pacific Ocean. Winter storms are gentle and little or no runoff occurs.



COMPREHENSIVE FRAMEWORK STUDY
LOWER COLORADO REGION
PHYSIOGRAPHIC PROVINCES

Figure 38

TABLE 6
CLIMATIC DATA
TRANSMISSION SYSTEM - GRANITE REEF AQUEDUCT
CENTRAL ARIZONA PROJECT

Location	Years of Record	Annual Precipitation (inches)				Annual Temperature (°F.)		
		Highest	Lowest	Mean	Snow	High	Low	Mean
Boulder City, Nevada	22	10.52	1.98	5.43	3.6	112	11	63.6
Searchlight, Nevada	17	18.34	1.83	7.75	3.4	111	6	66.8
Parker, Arizona	58	12.42	0.70	4.83	Trace	127	9	70.4
Salome, Arizona	48	16.75	2.99	7.96	0	118	15	67.1
Buckeye, Arizona	61	21.80	1.40	7.52	0	121	11	69.0
Davis Dam	11	--	--	3.37	0	121	20	72.2

Snow falls at some points along the transmission line route each year but seldom stays on the ground for more than a few hours. The low rainfall during the winter months is best illustrated by the sparse vegetation of this desert. During the summer and late fall, thunderstorms often cause localized flooding as illustrated by the flooding of Nelson Landing on September 14, 1974, which resulted in the loss of 9 lives.

Sonoran Desert rainfall is biseasonal from two distinct moisture sources. Winter precipitation is associated with moisture moving into the area from the Pacific Ocean, while the Gulf of Mexico supplies moist air for most of the region's summer rains. Rainfall may occur throughout the year but is more prevalent during July through September and again during December through March. Winter rains, sometimes lasting for several days, usually occur as gentle showers over a large area. Summer thunderstorms which can be very localized are generally of high intensity and short duration and produce many of the destructive flash floods which are typical in the Southwest. Snow is a rarity, melting rapidly when it does occur.

The mean annual precipitation varies from approximately 5 inches along the Colorado River to about 8 inches near Buckeye. Annual precipitation may vary from as little as 0.70 inch (recorded at Parker in 1947) up to 18 inches (recorded at Buckeye in 1941). Figure 39 shows the normal annual precipitation for the area.

Winds of high velocity occur frequently throughout the year. Prolonged winds are most common in the spring when they may last several days. As they sweep through the valleys, these winds carry considerable sand and dust, greatly reducing visibility by raising the airborne particulate levels to the point that driving on highways, roads, or streets is often delayed for safety purposes. Higher velocity winds occur during summer and are most frequently associated with thunderstorm activity. Very high levels of dust and sand concentrations are experienced during some of these storms. Frequently the natural particulate level from dust is higher than the National Ambient Air Standards for the area, as classified by the Environmental Protection Agency.

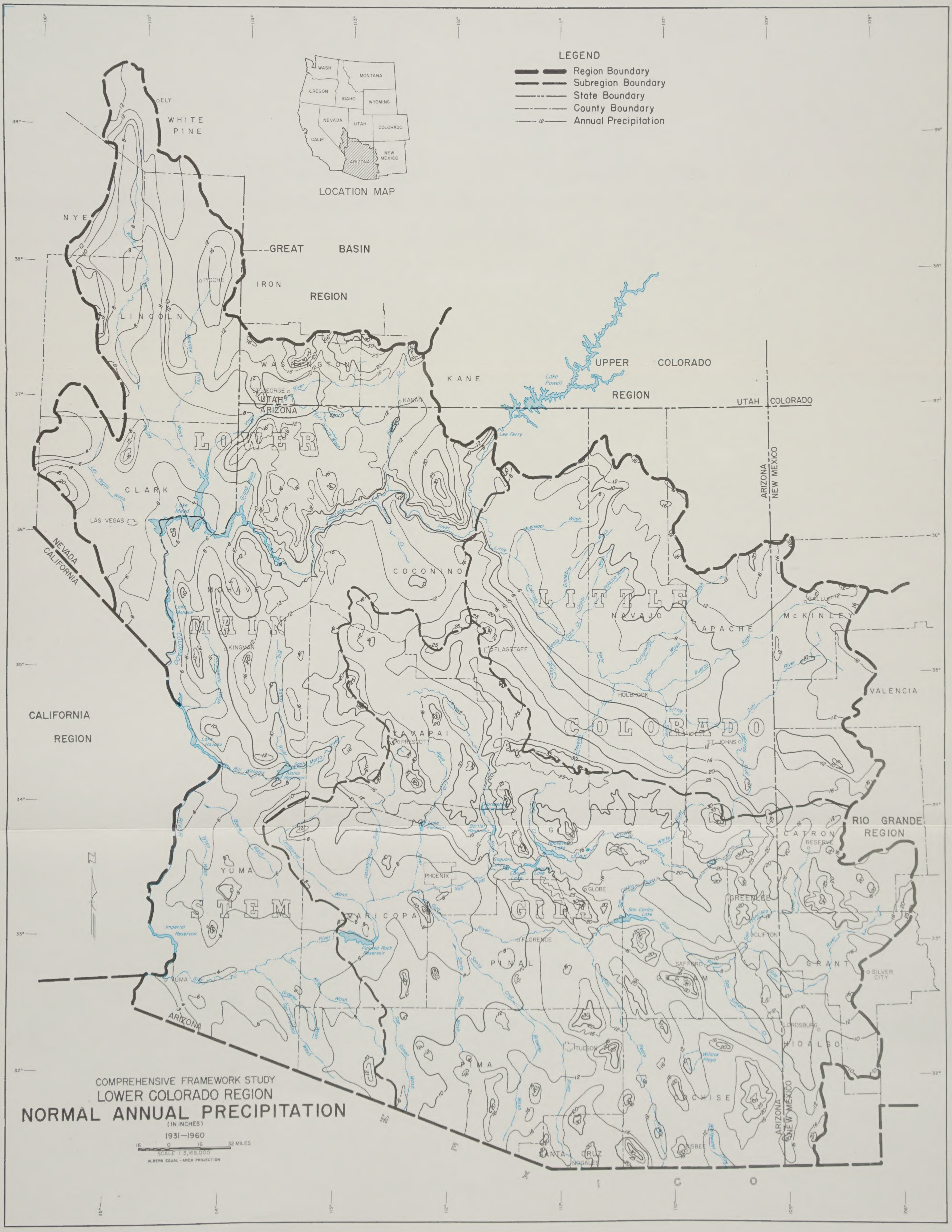
C. Geology and Soils 1-3, 29, 38-40, 43-46, 84, 87-89, 110-112, 134

1. General

The new transmission lines and substation are, in general, on the same alinement and right-of-way as or are located next to existing transmission systems. Deviations from existing alinements are minor and involve geologic situations similar to those encountered along existing systems.

Generally, the alinement will be in the basins where there will be soil foundations for the footings; however, in a few places where the

Figure 39


COMPREHENSIVE FRAMEWORK STUDY
LOWER COLORADO REGION
NORMAL ANNUAL PRECIPITATION
(IN INCHES)
1931–1960
SCALE 1:3,168,000
ALBERS EQUAL-AREA PROJECTION

alinement crosses mountain ranges the foundations will be in rock. The Parker-Havasu segment of the line, including the short underground portion, will be nearly all on gneiss, sandstone, conglomerate, and volcanic rocks.

The soils crossed by the transmission system are generally of alluvial origin and are typical desert soils. They have developed from various parent materials under arid conditions and have little or no horizon development. On the basis of age and morphology there are three groupings; old valley fill, recent alluvial, and residual soils. Many of the soils contain high concentrations of soluble salts and/or exchangeable sodium. Generally the soils are strongly calcareous and in many areas the carbonate has become cemented to form caliche. The soils are low in organic material and highly susceptible to wind and water erosion.

Ground water occurs in the thick alluvial deposits and bedrock margins of the desert basins. Depth to ground water is mostly in the range of 100 to 500 feet.

Land subsidence occurs in basins where large-scale pumpage for agriculture has led to significant declines in the water level. Earth fissures commonly appear along the periphery of subsiding areas. The transmission line generally passes through undeveloped areas upslope from the areas of major ground-water pumping. No problems have been experienced with existing transmission lines along the proposed alinement.

Existing structures indicate that adequate foundation is available for the new transmission line and substation. Individual footings for the towers are designed to accommodate the local situations, as are foundations for the switchyards. Existing structures and transmission systems indicate that few geologic problems will be encountered in the construction of this system.

2. Geology and Topography

The transmission line routes will traverse mountains and alluvium-filled valleys of the Basin and Range Physiographic Province (Figure 38). The mountains or ranges are commonly narrow and elongated and rise hundreds of feet above the surrounding nearly flat valley floors. The ranges trend generally northwest-southeast except for an area east of Parker, Arizona, where a few ranges trend northeast-southwest. The valleys or basins are generally connected and are drained by washes and intermittent streams into the Colorado River and its tributaries, the Bill Williams and Gila Rivers.

The present topography was formed by Tertiary Age block faulting. Areas that are now basins were gradually displaced downward, often a thousand feet or more with respect to the ranges. The basins were subsequently deeply filled at first by lake deposits and then by alluvial fan material from erosion of the surrounding mountains. Thus, only the tops of the upthrown blocks extend above the alluvium as mountains. Alluvial fans also lap up on the sides of the mountains and cover rock benches known as pediments. Near the surface, alluvium in the basins generally consists of clay, silt, and sand of various mixtures. Near the edges of the basins in the upper part of the fans, the material is commonly coarser with silty gravel, cobbles, and boulders. Caliche cementation is common near the edges of the basins particularly in soils derived from volcanic rocks.

The mountains or ranges are generally composed of Precambrian granite and metamorphic rocks in places overlain by Paleozoic to Mesozoic metasediments, Cretaceous to Tertiary sandstone, mudstone, and conglomerate. The older rocks are in places intruded by granitic rock of Laramide age and fine-grained intrusives ranging from rhyolite to basalt. These rocks range in age from Cretaceous to Quaternary, with acid rocks the oldest and basic rocks the youngest. In many places, these fine-grained rocks came to the surface and were extruded as flows of rhyolite, andesite, basalt, and intermediate rock types. Additionally, pyroclastic tuffs and volcanic breccias are commonly interlayered with the flows. Many of the ranges are capped by these volcanic rocks.

3. Earthquake Hazard [43-46]

The potential earthquake hazard to the transmission system facilities is considered to be low. Existing transmission lines paralleling most of the proposed alinement have not experienced any damage since their installation over 40 years ago. Severe earthquakes in California and Mexico have been widely felt throughout southern and western Arizona and adjoining Nevada, but only a few weak earthquakes have had epicenters in or near the project area during the 122 years of recorded earthquake history. Severe earthquakes in western Nevada have been felt as far south as Las Vegas. No earthquake damage has been reported in the project area, and the powerlines which have been in place nearly 40 years over nearly all of the alinement have suffered no damage attributable to earthquakes. Based on available data, the probable maximum earthquake expected along the entire system would have an intensity of V to VI on the Modified Mercalli Scale which ranges from I (weak) to XII (very strong).

4. Mineralization [89]

The mountain ranges in the vicinity of the transmission facilities have been heavily prospected. While traces of copper, gold, iron, silver, manganese, and lead are common, most notably in the Searchlight, Nevada, area there has been little production of metallic ore due to the low grades, limited size of ore bodies, and high production costs. There has also been minor local extraction of nonmetallic minerals, including sand and gravel, fluxing quartz, rough building stone, semiprecious gemstone, and calcite for lime production. The existing transmission lines have caused no problems to mineral production or prospecting, and no problems are expected with this new system. Detailed maps from the Bureau of Mines for the States of Arizona and Nevada are available to indicate generalized areas of specific mineralization. With no active mining production within the rights-of-way a listing of claims or operations off the alinement is not included.

D. Vegetation 51-55, 79, 88, 90, 109, 112, 115, 117, 131

The transmission system will traverse two distinctly different Southwestern deserts with differing vegetal communities. North of the Bill Williams River, the system will cross the northeastern part of the Mohave Desert, and in the Bill Williams River area will cross a transition zone between the Mohave and Sonoran Deserts of the southern part of the system. The Mohave Desert is predominantly shrubby, whereas the Sonoran Desert is characterized by a large percentage of trees, large shrubs, and more diverse cacti. This vegetation difference is primarily due to the higher summer rainfall of the Sonoran Desert.

The effect of seasonal precipitation, or lack thereof, is very pronounced and dramatic upon the vegetation found along the transmission system and within the lower Sonoran life zone. Numerous winter, spring, and summer grasses and forbs respond to rainfall by germination from dormant seeds. In years of above-normal rainfall, a green and flowering desert is evident. During dry years the seeds and plants on the desert remain dormant except for the highly prominent species of trees, bushes and cacti. This dramatic effect of spring vegetation was observed in 1941 and again in 1973. In 1974, due to lower rainfall, the lack of vegetation growth provides a graphic illustration of the annual differences possible. Following the growing season when abundant rainfall has resulted in the growth of grasses and forbs, the dry plants are in some areas dense enough to carry wildfire. This is an exceptional condition to the usual forage and fuel availability that normally is insufficient to carry fire. The typical conditions are readily observed in the illustrative photographs.

The Arizona portion of the route will pass through areas where the plants are protected under the Arizona Native Plant Act (Arizona Revised Statutes, Sec. 3-901, et seq. - 1972 Sup.). Some species of the Liliaceae (lily) and Cactaceae (cactus) families, Fouquieria (ocotillo) genera, Dalea spinosa (smoke tree), and Holacantha emoryi (crucifixion thorn) are the protected plants expected to be found within the area of the transmission system.

The Nevada legislature has authorized the State Division of Forestry to propose a list of flora to be protected. The Division will propose a law similar to the Arizona Native Plant Act to the 1975 legislature.

A list of flora and a native plant protection law is under study by the State of California. At the present time no desert plants are protected in the State of California.

The Federal Government under the Endangered Species Act of 1973, P.L. 93-205, is in the process of developing a list of plants under the provisions of Section 12 of the Act. This list is not available yet, and it is unknown what species that may become listed will be encountered along the transmission system alinement.

This discussion is oriented toward the prominent or dominant species within areas of dominant-type change. Listings of the plants are included in Appendix C, Tables 4, 5, and 6. In some areas imported or exotic vegetation species have been introduced and are exceptionally prominent during years of above-average precipitation, or when growing next to the Colorado River channel or one of its reservoirs. Reference to riparian growth in general refers to desert wash vegetation and not riverine vegetative communities. These communities are differentiated by the either intermittent or perennial nature of the water course.

The vegetation (Figure 16) of the section from Mead Substation to the Eldorado-Nelson Road is sparse, generally consisting of creosote bush with scattered bursage and occasional Mohave yuccas. Vegetation in the vicinity of the Eldorado Mountains is sparse and is generally creosote bush and cacti with scattered ephedra and bursage. Stunted acacia (catclaw) are found in the arroyos and washes due to increased moisture. Through the center of Eldorado Valley's south end (Figure 40), the principal plant community is creosote bush/bursage with scattered stands of cane cholla and other small cacti. In the area from U. S. Highway 95 in the southern part of Eldorado Valley to Searchlight, Nevada, creosote bush/bursage is the principal vegetation with some thick stands of Mohave yucca. Scattered Joshua trees, ephedra, and beavertail cacti can be observed on the higher, drier lands, and acacia (catclaw) grows in or adjacent to numerous washes.

The vegetation in the Searchlight area (Figure 18) is principally a creosote bush/bursage community with numerous acacia trees, some Joshua trees, and very large Mohave yucca. From Searchlight to the base of the Newberry Mountains (Figure 41), the desert is a sparse creosote bush/bursage community with occasional Mohave yucca. Vegetation adjacent to the Newberry Mountains is a creosote bush/bursage community with scattered banana yucca and Mohave yucca. Thick stands of teddybear and cane cholla can be observed. The area between the Newberry Mountains and Davis Dam (Figure 42) is principally creosote bush with scattered bursage, cholla and beavertail cacti. Near the base of the Newberry Mountains, creosote bush with willow and acacia in the arroyos can be observed. Some Sego lilies can be observed with the sparse creosote bush on the terrace overlooking the river.

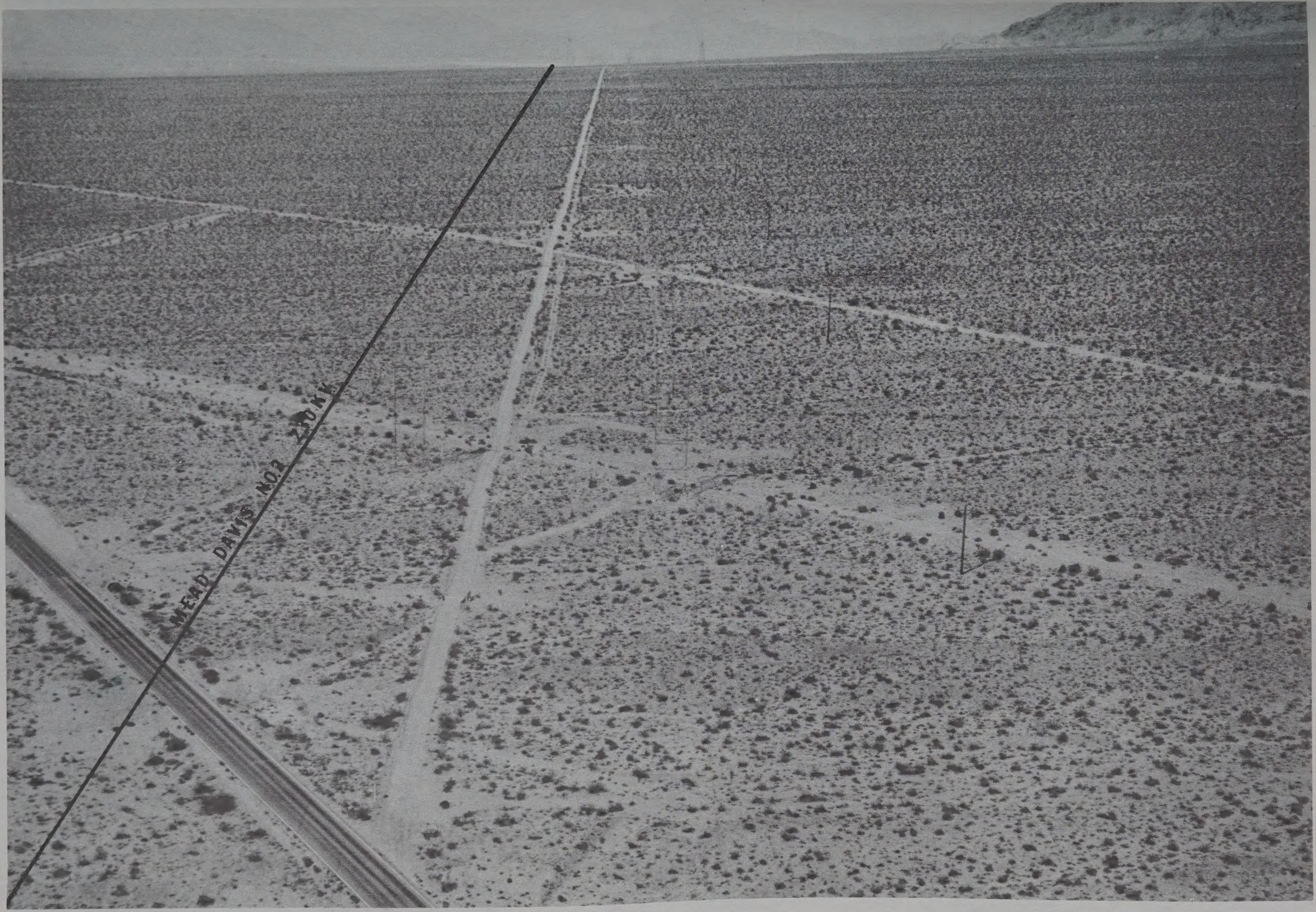


Figure 40. Southern Eldorado Valley--View north of Searchlight, Nevada, at crossing of U.S. Highway 95 showing transmission alinement. The principal plant community is creosote-bursage with scattered stands of cane cholla. The wood-pole lines are much more visible in this area than the steel towers of the Metropolitan Water District's existing 230-kV lines--Mead-Davis 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01250NA.

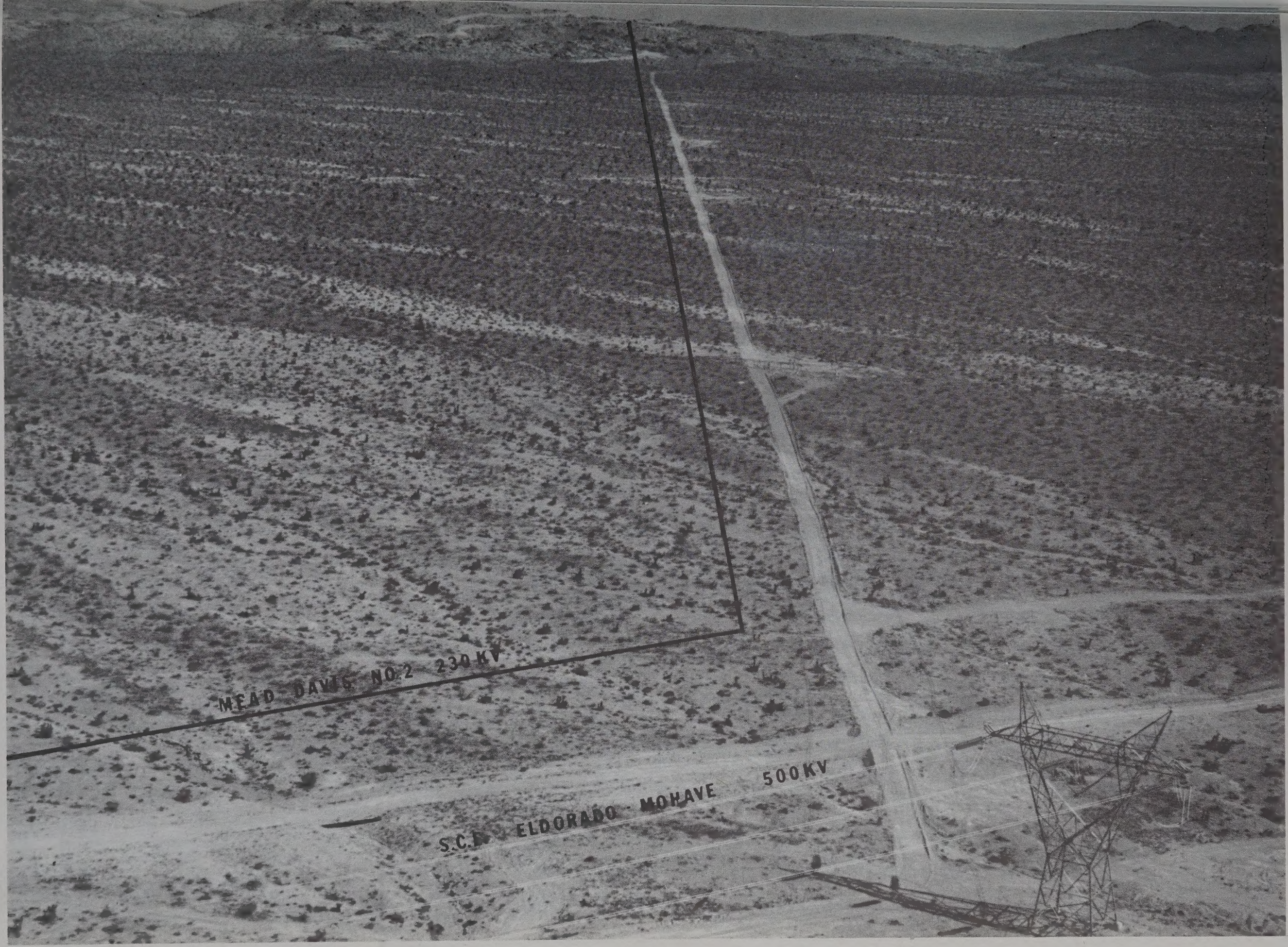


Figure 41. Nipton Road to Newberry Mountain Area--View east of Newberry Mountains showing transmission alinement. This is a sparse creosote-bursage community with occasional Mohave yucca--Mead-Davis 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01266NA.

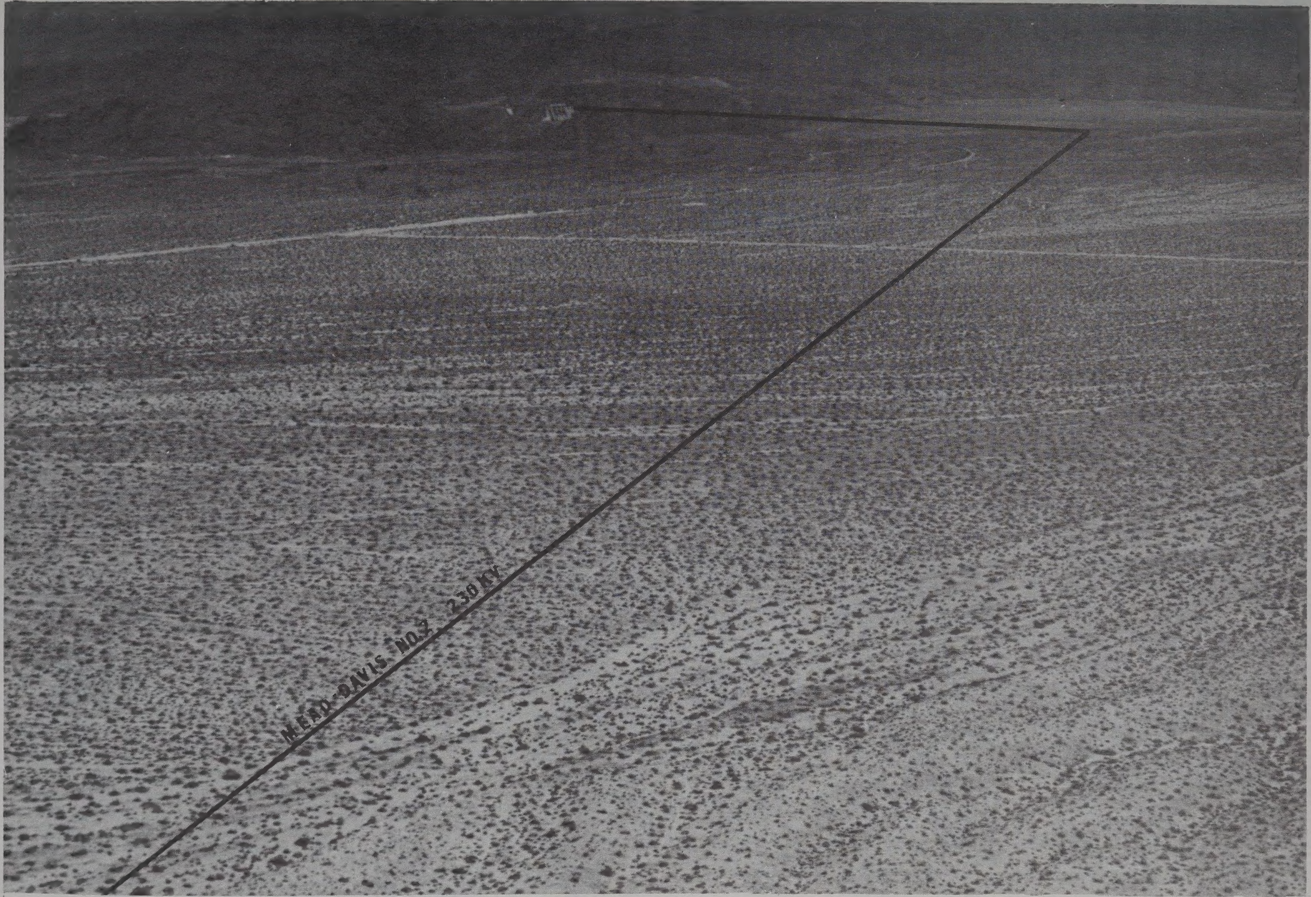


Figure 42. Newberry Mountains to Davis Dam--View northeast toward Davis Dam showing the transmission system alinement. The principal vegetation is creosote bush with scattered bursage, cholla, and beavertail cactus--Mead-Davis 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01273NA.

From Davis Dam to Silver Creek Wash south of Bullhead City (Figure 43), the vegetation is creosote bush/bursage and cane cholla with scattered acacia in the washes and arroyos. In the Silver Creek Wash area, the vegetation is a typical creosote bush/bursage community with occasional stands of Sego lilies and ocotillo in the flat or sandy areas. The washes and arroyos contain paloverde and smoke trees. The vegetation of the mesa beginning at Oatman Road (old U.S. Highway 66) (Figure 43) is predominantly creosote bush and paloverde with scattered barrel cactus, some of which stand 6 feet high. The vegetation density and growth are greater in the canyon bottoms, where a greater amount of water is available annually from runoff.

The vegetation north of Sacramento Wash (Figure 44) is creosote bush/bursage with an intermittent stand of ocotillos. The washes of the area contain paloverde and acacia communities. The vegetation from the junction of Sacramento Wash and U.S. Highway 66 leading to Yucca, Arizona, to Arizona Highway 95 is ocotillo, paloverde, scattered teddybear cholla, agaves, and Mohave yucca. The southern half of this area contains saguaro cacti which here become noticeable.

The vegetation of the area through the Aubrey Hills to Parker Dam (Figure 45) is a creosote bush/bursage community with scattered bunch grass. The area contains a few scattered saguaro and ocotillo with smoke trees and paloverde trees restricted to the washes.

Vegetation on the ridges of the Buckskin Mountains (Figure 24) consists primarily of scattered paloverde, ocotillo, and creosote bush. Along the base of the range, ocotillo is abundant. In and near the washes are paloverde, ironwood, smoke tree, brittlebush, and bursage (Figure 46). Saguaro cacti begin to appear prior to reaching the sand dunes at the Cactus Plain.

The vegetation of the Cactus Plain (Figure 47) is denser than that of the Buckskin Mountains; however, as total ground cover, it is still comparatively sparse. It consists of large paloverde, ironwood, ocotillo, creosote bush, and saguaro, cholla, and hedgehog cacti. Scattered forbs and grasses are found during seasons of above-normal rainfall.

In Butler Valley and through the Harcuvar Mountains, the vegetation is principally a creosote bush community with scattered paloverde, bursage, and saguaro cacti. Figure 12 shows the vegetation in the area of the proposed Harcuvar Substation. In the Harcuvar Mountains, the numbers of saguaro cacti increase quite significantly with scattered ocotillo, grasses, and forbs.

On the floor of McMullen Valley, the principal vegetation is creosote bush with scattered paloverde trees, and annual grasses and forbs. Along the numerous washes galleta grass can be found. The alluvial fans of the edge of the valley are dominated by creosote bush/bursage, cholla, paloverde and ironwood trees.

The vegetation of the area from Aquila to the Hassayampa River (Figure 48) is a sparse cover of creosote bush, scattered mesquite and paloverde trees, and annual grasses and forbs. On both sides of the Hassayampa River (Figure 49), cresote bush and saltbush are the dominant vegetation. In some areas, the vegetation can become quite dense.

The vegetation from the Hassayampa River to the southern end of the White Tank Mountains is principally cresote bush, scattered mesquite and paloverde trees, and annual grasses and forbs. Along the southern end of the White Tank Mountains on the alluvial fans, the vegetation is predominantly a creosote bush community with scattered ironwood and paloverde trees, cholla, and annual grasses and forbs. The transmission system then crosses an area of creosote bush/bursage, scattered ironwood and paloverde trees, cacti (including saguaro, cholla, and barrel), ocotillo, and annual grasses and forbs.

The last 2 miles are through highly developed irrigated agricultural lands. The principal crops grown in this area are cotton, sorghum, small grains, and alfalfa (Figure 14).

The 115-kV transmission line from Harcuvar Substation to the Bouse Hills Pumping Plant will pass through the Butler Valley vegetation community into the Bouse Hills (Figure 46).

At the Bouse Hills area (Figure 31), where the terrain is rugged and the soil mantle thin and rocky, the vegetation changes from the paloverde community to predominantly cholla cactus.

The 115-kV line from the Harcuvar Substation to the Little Harquahala Mountains Pumping Plant will pass through the creosote vegetal community of Butler Valley. In the Little Harquahala Mountains, the vegetation is a creosote bush/bursage community to paloverde community, interspersed with cholla and saguaro cacti (Figure 32). At the borrow pit used for construction of I-10 at the Salome Interchange, invading saltcedar supported by ponding of rainfall is becoming established.

The Hassayampa 115-kV line that will be routed near the Hassayampa River will be through an area dominated by creosote bush with scattered mesquite and paloverde trees, and annual grasses and forbs.

E. Wildlife 1-3, 56-74, 88, 95

1. Invertebrates

The invertebrate fauna of the area consists of over 200 orders and thousands of species, most of which are unstudied. The most noticed invertebrates to be found there are various species of scorpions, spiders, earwigs, flies, bees, wasps, termites, ants, butterflies, moths, crickets, and beetles.

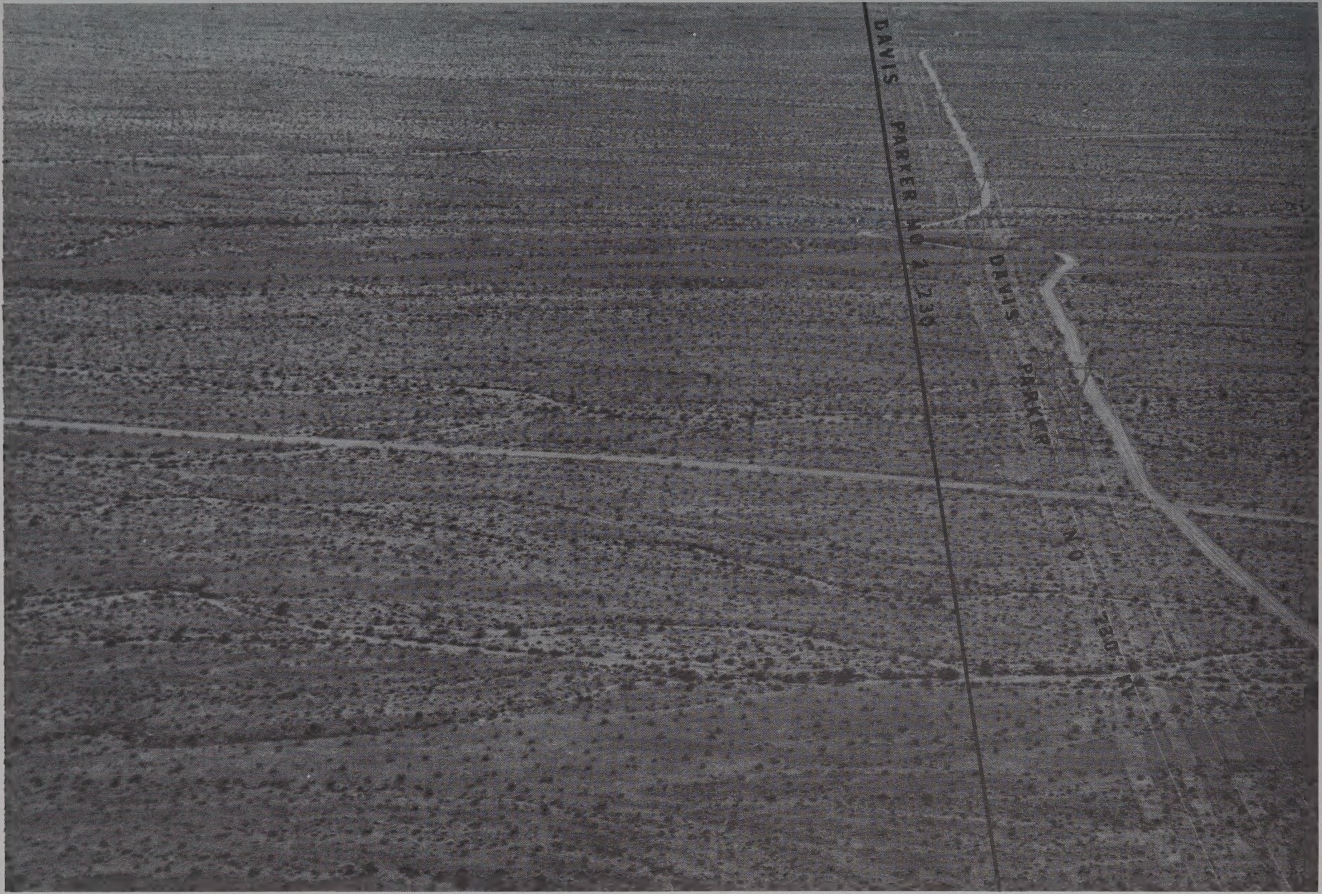


Figure 43. Oatman Area--View south showing the transmission system alinement along the Davis-Parker 230-kV No. 1 Line, in a creosote-bursage community--Davis-Parker 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01197NA.

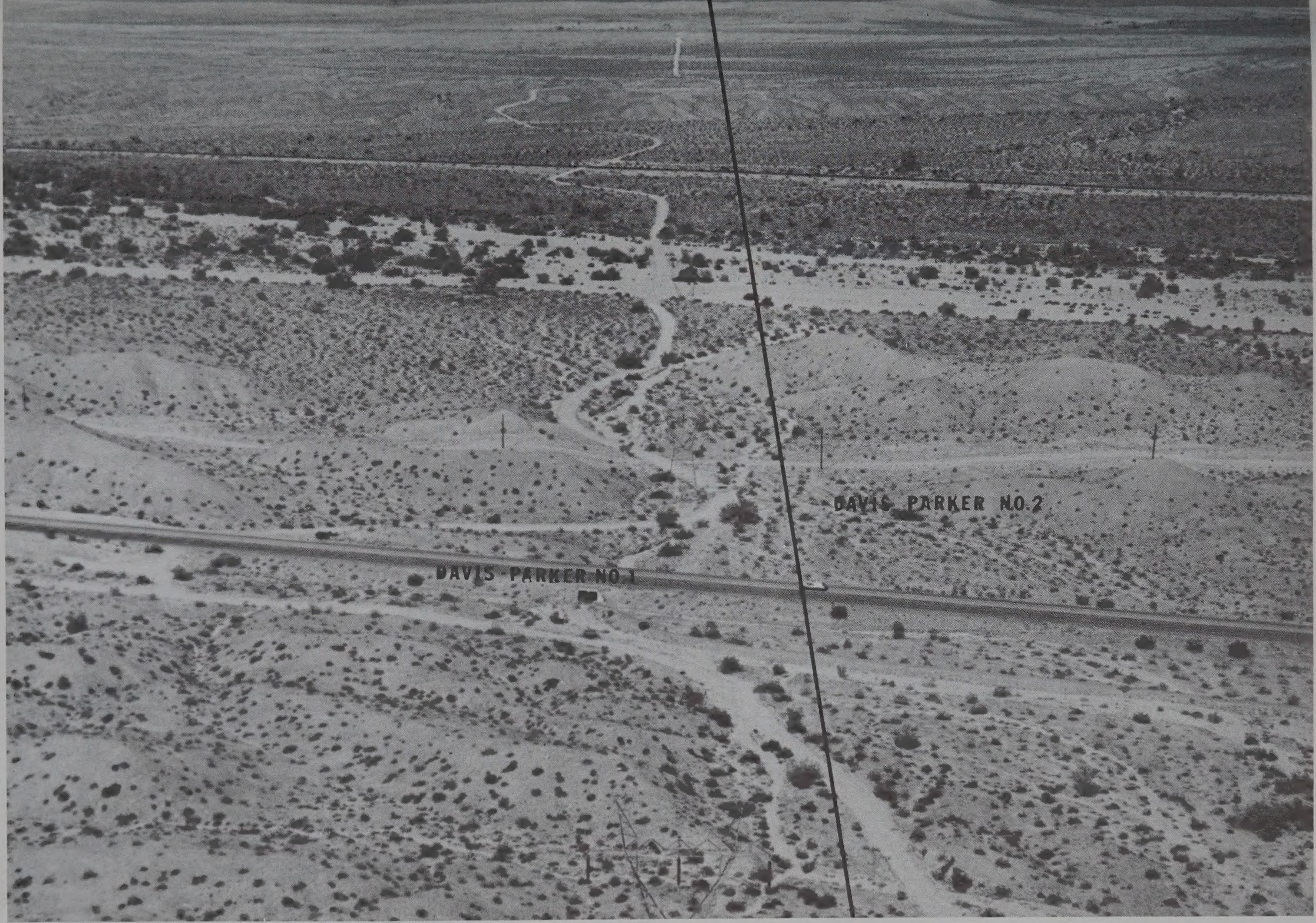


Figure 44. Sacramento Wash Area--View north showing U.S. Highway 66. Sacramento Wash, Santa Fe Railroad, and the transmission system alinement paralleling the Davis-Parker 230-kV No. 1 Line. The principal vegetation is creosote, ocotillo, paloverde with scattered cholla--Davis Parker 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01201NA.

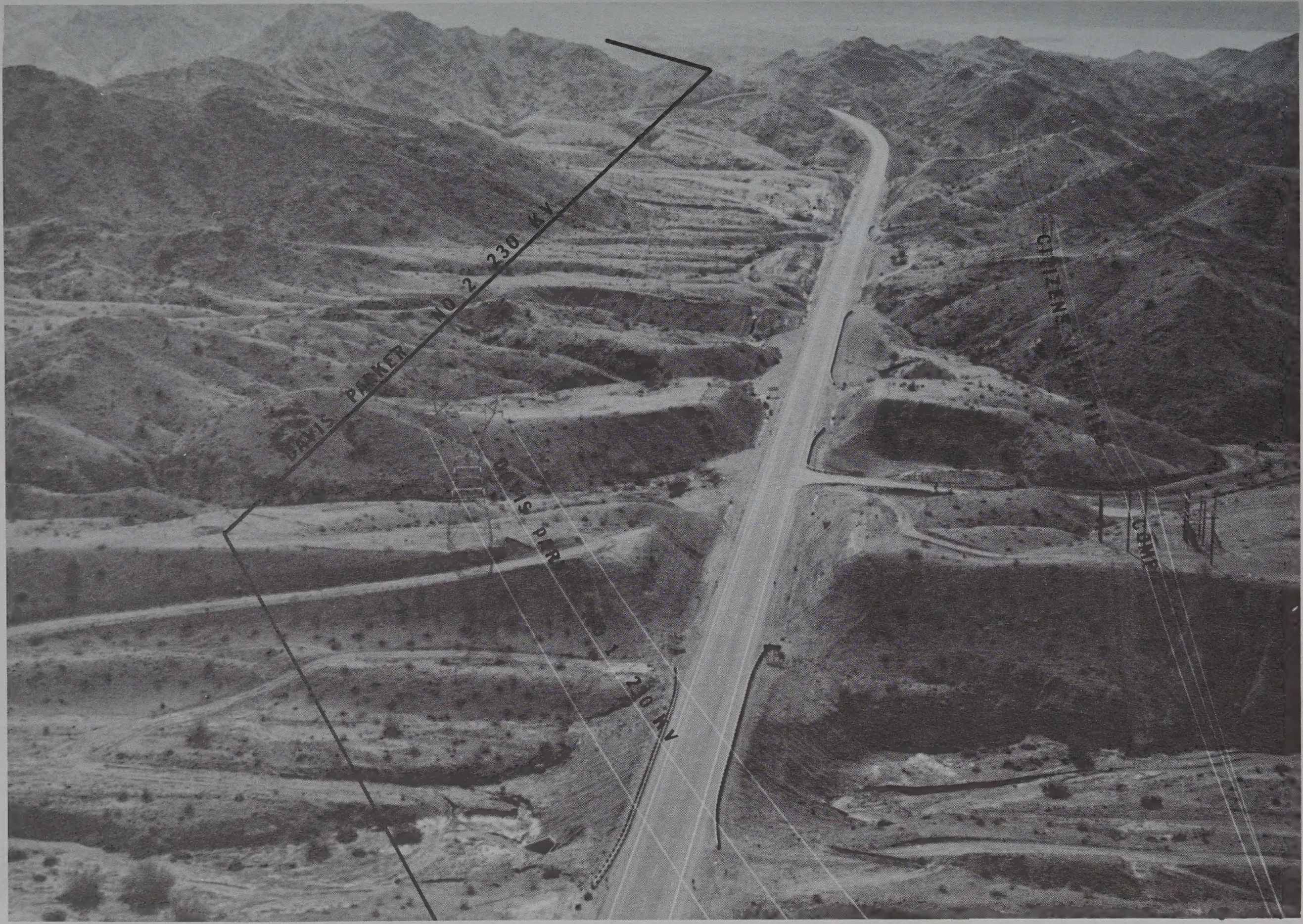


Figure 45. Aubrey Hills Area--View south toward Parker Dam showing the south of the crossing of Arizona Highway 95 in a creosote-bursage community. The alinement parallels the existing Davis-Parker 230-kV Line--Davis-Parker 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01222NA.

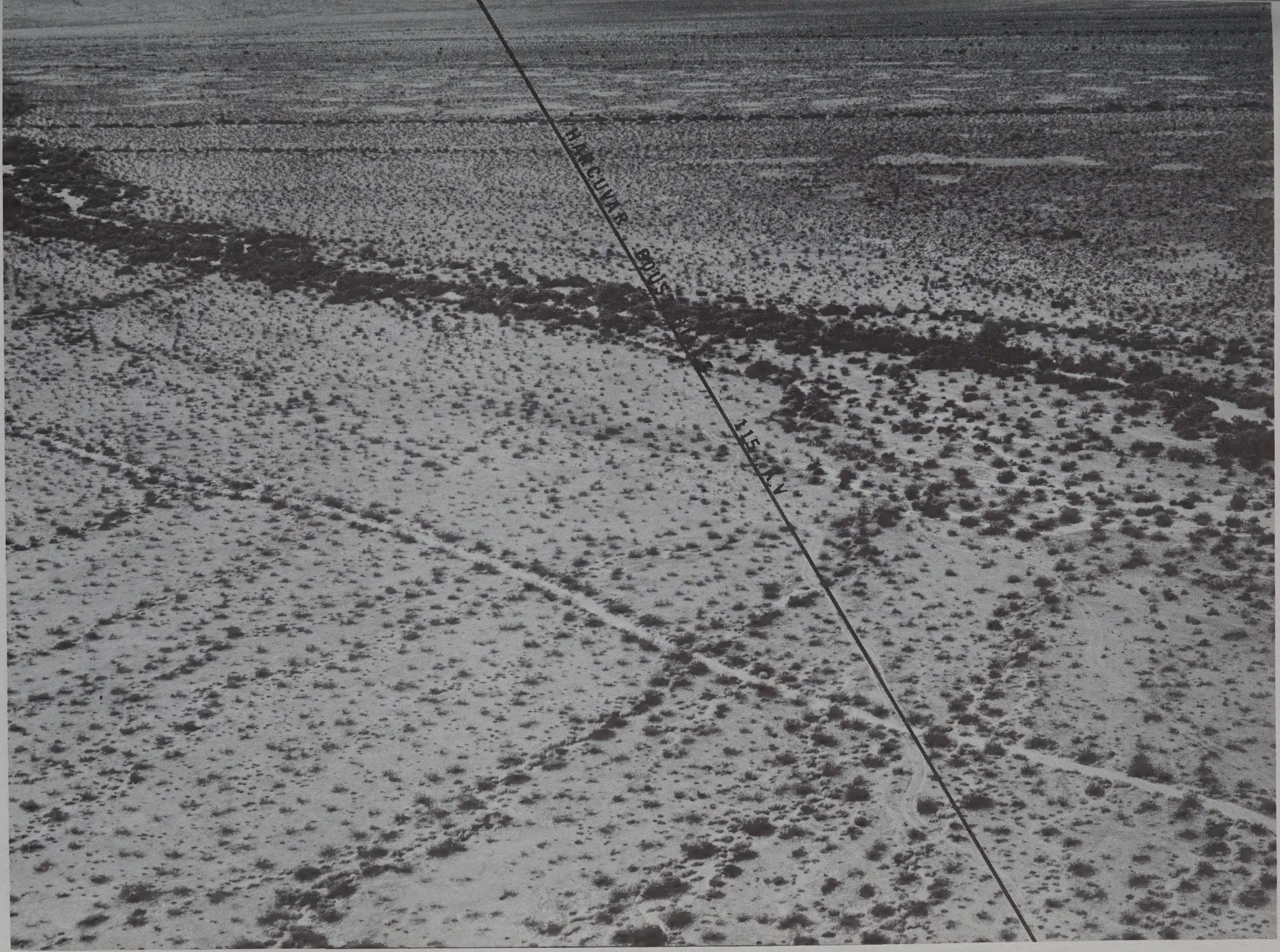


Figure 46. Cunningham Wash Area--View northwest showing the alinement through native desert. Desert riparian vegetation can be observed along the wash--Harcuvar-Bouse Hills 115-kV Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01179NA.

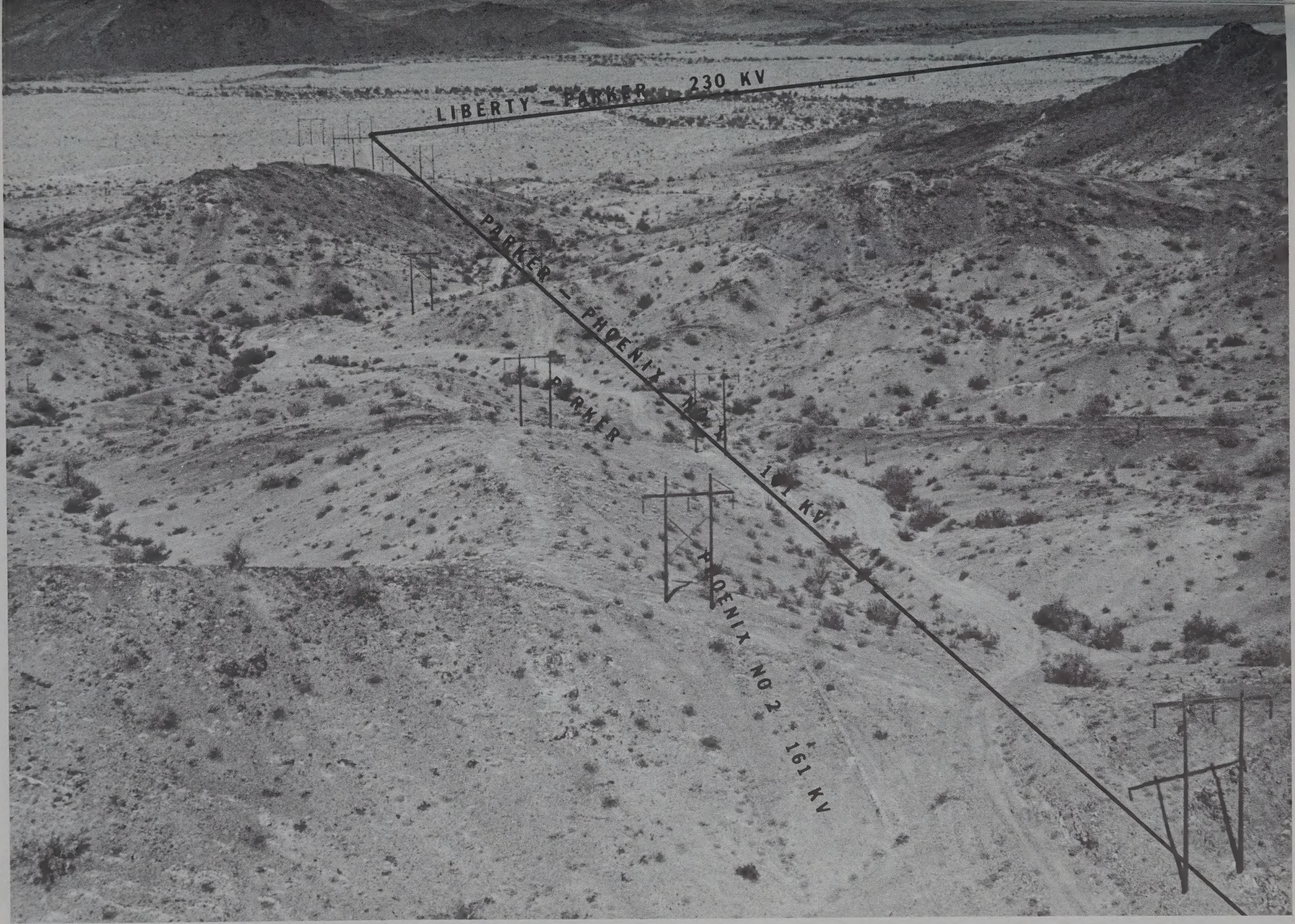


Figure 47. Cactus Plain--View west into Cactus Plain showing transmission system alinement replacing the Parker-Phoenix 161-kV No. 1 Line. This is an area of sparse vegetation principally creosote bush, paloverde, ironwood, ocotillo, saguaro, cholla, and hedgehogs--Liberty-Parker 230-kV Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01146NA.

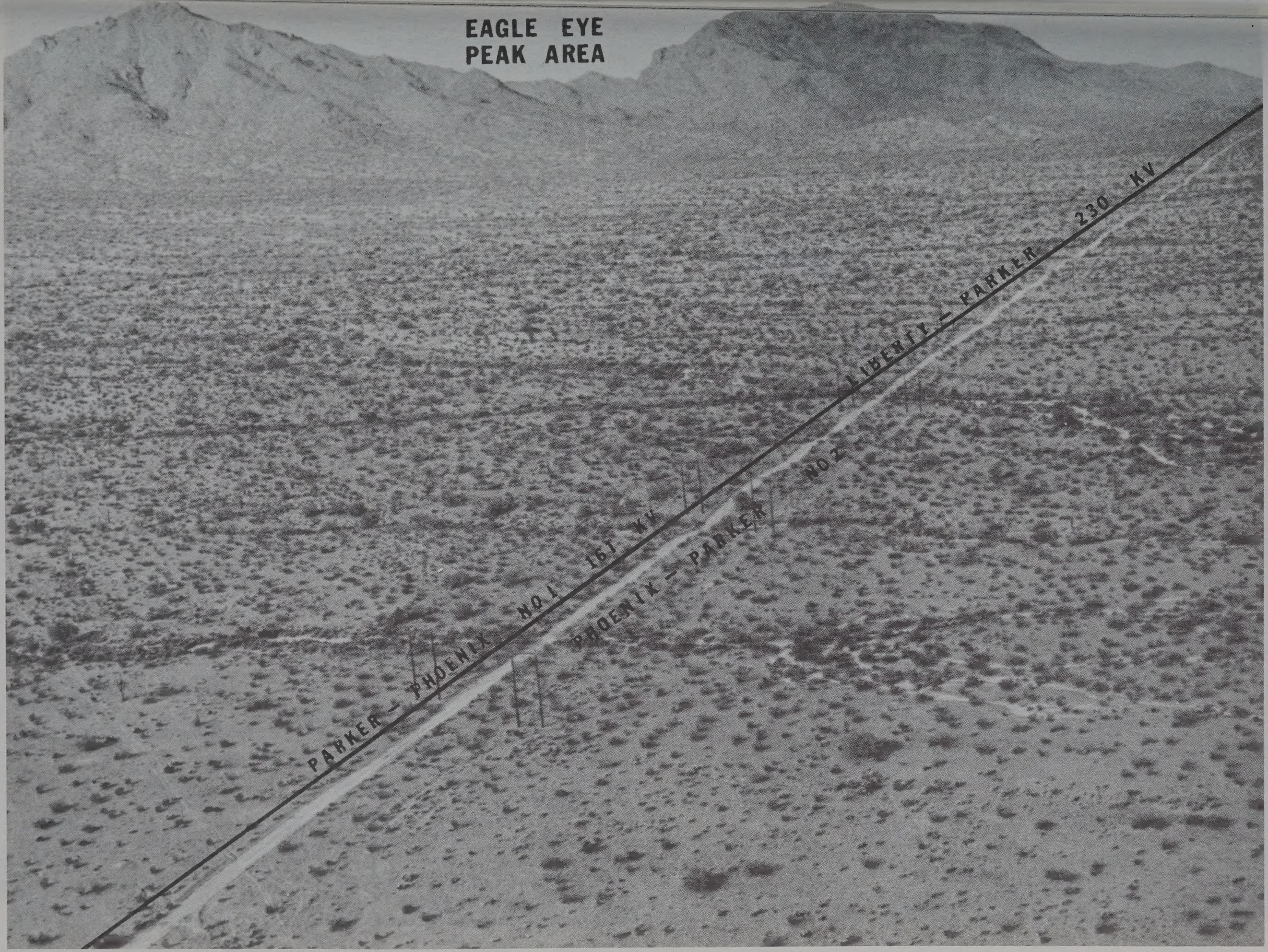


Figure 48. Eagle Eye Peak Area--View northeast showing transmission system alinement on the Parker-Phoenix 161-kV No. 1 Line. A vegetation community of creosote and bursage--Liberty-Parker 230-kV Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01128NA.

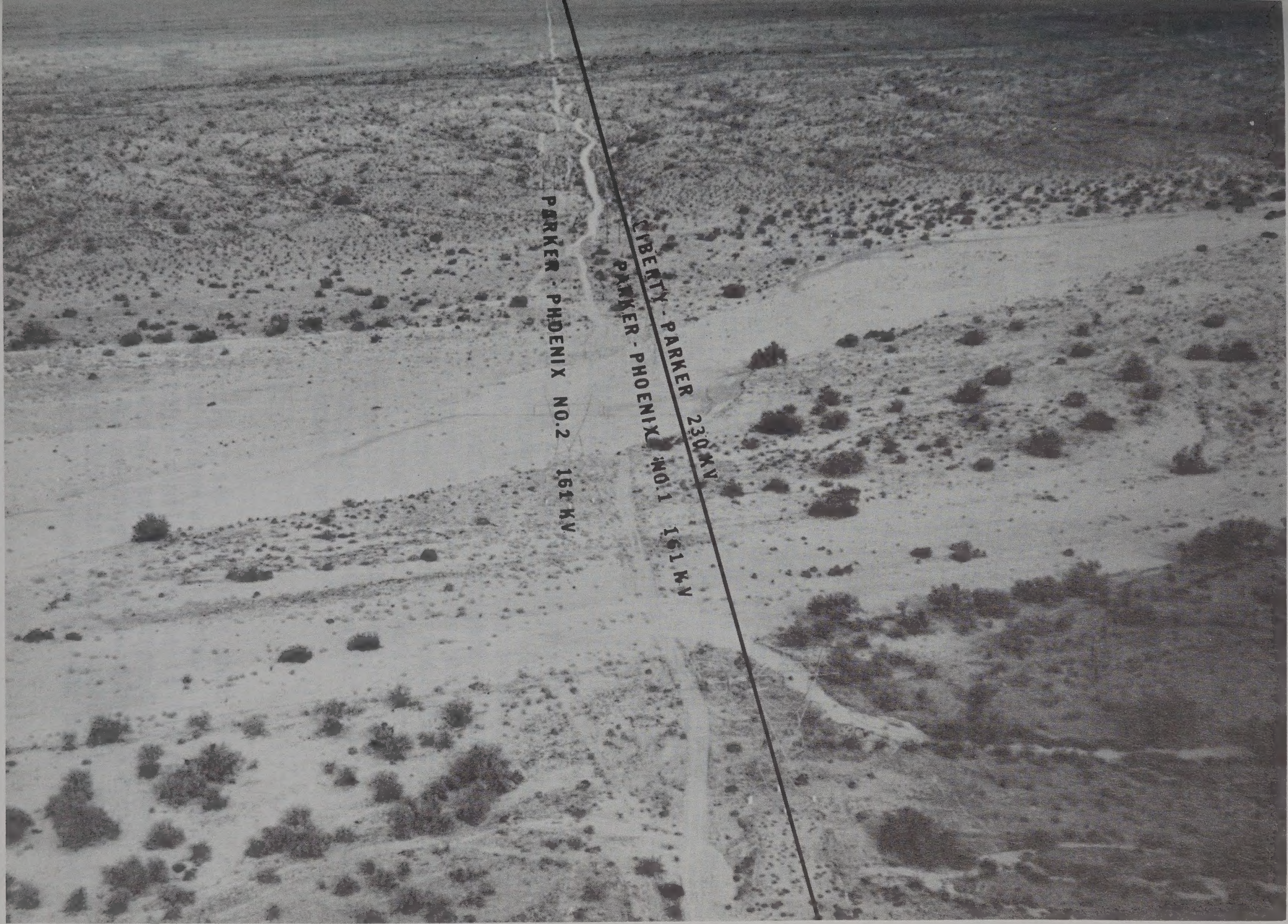


Figure 49. Hassayampa River--View southeast, showing transmission system crossing of Hassayampa River on the existing 161-kV Parker-Phoenix No. 1 Line. The vegetation in this area is creosote bush, paloverde and scattered bursage--Liberty-Parker 230-kV Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01123NA.

An example of the complexity and relative unknown nature of the area's invertebrate fauna is the spider (Order Araneida). Dr. Mont A. Cazier, Professor of Zoology at Arizona State University, indicates that there is no definitive work on the spiders of the area. He further points out that there are several hundred species belonging to about 42 families and over 100 genera in the central Arizona area.

Except for the Colorado River, aquatic invertebrates are essentially absent from the area because of the limited amount of permanent water. Some aquatic invertebrates do exist in catchments, stock tanks, and where temporary ponds are formed after a rain. Some of the more common aquatic invertebrates found in the area are: mayflies, damselflies, caddiceflies, mosquitos, flatworms, snails, and fresh-water shrimps and clams.

2. Vertebrates

a. Fish [2, 3]

Fish species are present in the Colorado River where the transmission line crosses near Davis and Parker Dams. The major game species include largemouth bass, bluegill, black crappie, channel catfish, striped bass, and rainbow trout. Because no impacts on fish in the Colorado River are foreseen as a result of this project, a list of the area's fish species is not included in the appended material.

b. Amphibians and Reptiles [56]

There are 44 species of amphibians and reptiles in the area, of which 27 are common to very common. Table 1, Appendix C is a list of amphibians and reptiles that are found in the transmission system area. This table indicates the relative abundance of each species listed. The most noticeable types of amphibians and reptiles include toads, various lizards, and snakes. The spring and late fall are the best times to observe them. At other times of the year they go unnoticed since they seek protection from the heat or cold. The Gila monster, which was once abundant in Arizona, is sometimes taken as a pet and is often illegally bought and sold.

c. Birds [57-59, 143]

Table 2, Appendix C, lists the birds that are found in the area that the transmission system will traverse. The abundance of each species in relation to other similar species is indicated. There are about 50 species (two of which have been introduced) of desert residents which use the area for nesting and depend on the desert to provide food. These birds construct their homes in various ways, utilizing the available resources. For example, owls burrow in the ground and build their nests or use flicker scars in saguaro cactus. Doves use desert and wash trees for nests while quail are ground nesters and still others, such as cowbirds, parasitize other birds' nests. The nature of the bird fauna of the Mohave Desert differs from that of the Sonoran Desert. Many species of birds use the Colorado River as a migration flyway and other species use it as a permanent or winter home. The vegetation becomes progressively more dense and diverse in species from west to east in this life zone. The bird fauna changes and also becomes more dense to the east.

White-winged and mourning doves utilize desert and wash vegetation, especially mesquite, for food and nesting. Doves are indigenous throughout the area and are found in higher densities close to agricultural areas such as Centennial Wash where irrigation water and grain crops provide more food sources. Mourning doves throughout areas such as the Harquahala Plains and the Buckskin Mountains are relatively sparse when compared to irrigated agricultural areas with water and feed grains.

There are 17 species of hawks and hawk-like birds, and 7 species of owls that frequent the area. The most common of these are the Cooper's hawk, red-tailed hawk, common screech owl, and the great horned owl.

d. Mammals[58, 60-62, 64-69]

Table 3, Appendix C, lists the names of native and introduced mammals found along the route of the transmission system and indicates the relative abundance of each species. Sixty-five species of mammals are found in the area, of which 38 are common to very common. The types of mammals found in a specific area are influenced by such factors as elevation, soils, vegetation, climate, and topography. Where the soil is fine sand and vegetation is sparse, kangaroo rats and pocket mice are found. Cotton rats, pocket gophers, and javelina are found in grassy or desert riparian areas. As the desert type changes between Lake Havasu and Phoenix, the mammal fauna changes. Javelina is a Sonoran species and will be found only in the eastern portion of the route. Numbers of javelina found in this area are relatively low because the environment in the Sonoran Desert and in the Phoenix area is not as conducive to this species propagation due to such factors as less water and vegetal cover than there is further to the southeast. Desert bighorn sheep, canyon mice, and ground squirrels are historically found in rocky areas like the Buckskin Mountains; antelope ground squirrels, jackrabbits, deer mice, coyotes, ringtails, desert wood rats, badgers, mule deer, and others are found in open desert and mesquite bosque areas of the Harquahala Plains; and javelina, mule deer, rabbits, skunks, wood rats, raccoons, and others are characteristically found in desert riparian areas such as the Hassayampa River. Like the vegetation, the densities of mammal populations increase in these riparian areas where water is more plentiful, even though intermittent. Water is the limiting factor in animal populations and vegetation density throughout the entire area traversed by the transmission system. It is also obvious that the larger species of mammals cannot be characterized and isolated to a specific type of habitat. Examples are the bighorn sheep and mule deer. Of these two species, the bighorn sheep is perhaps the more restricted, and mule deer the less restricted.

The desert mule deer which utilize the desert regions of the area are highly migratory. They respond to weather conditions, moving away from permanent water when rain and wetter conditions allow, but are bound to these permanent waters during dry weather. Lack of water during drought periods is the limiting factor and consequently mule deer population density over the large areas of the desert is quite sparse. Development of water catchments and other manmade watering places, some with a permanent supply, has had the effect of stabilizing and at times increasing the density of the deer population.

Bighorn sheep populations are estimated by the extent of mountain habitat areas. The Arizona Game and Fish Department estimates the total population of bighorn sheep in the State is 3,000. Only five mountain areas along the transmission system now support resident populations: the Buckskin, Harquahala, and Black Mountain ranges in Arizona, and the Newberry and Eldorado Mountain ranges in Nevada. Other ranges historically had sheep but now support only transient individuals. This situation may also be applicable to the Harquahala Mountains.

Another large herbivorous mammal that occurs in portions of the alinement area is the feral burro. There has been much speculation as to the ecological implications of increasing burro populations, especially in relation to bighorn sheep. The burro is protected by Federal Law.

3. Threatened Species [72, 73]

The Endangered Species Act of 1973 broadened the scope of the existing program and the responsibilities for participation by all Federal agencies. The requirements of the Act are being closely followed in environmental studies and construction activities throughout the entire Central Arizona Project. However, there are no known endangered species that will be directly affected by the transmission system.

The line will cross the Colorado River at two points near Davis and Parker Dams. Two species of fish from the Colorado River listed in the Fish and Wildlife Service's (FWS) March 1973 edition of Threatened Wildlife of the United States are the Colorado squawfish (Endangered) and the humpback sucker (Status Undetermined). Both were once abundant in the lower Colorado Basin but are now apparently confined to the upper

Colorado. The Arizona Game and Fish Department has plans to reintroduce the Colorado River squawfish into parts of the Colorado River where they are now endangered or extinct.

The Gila monster is listed as status undetermined in the 1973 edition of Threatened Wildlife of the United States.

Among the birds found along the transmission system five infrequently found species are listed as threatened (T) or endangered (E) or status undetermined (SU) by FWS. The peregrine falcon (E) and the prairie falcon (T) are seasonal, transient, or rare inhabitants of the project area. The southern bald eagle (E) and the osprey (SU) are migrant throughout the area. The Yuma clapper rail (E) breeds in the marshes along the Colorado River.

The spotted bat (T), whose range covers much of the Western United States where it is naturally rare, has been reported four times prior to 1967 in Yuma and Maricopa Counties, Arizona, and is included on the 1973 list of threatened wildlife.

F. Air [31, 32, 134]

Air quality in terms of natural and manmade pollution is highly variable along the transmission system. The area in which the system will be located has experienced a progressively noticeable increase in air pollution in the past few years due to the rapidly increasing population of the entire Southwestern United States. In the desert areas west of the White Tank Mountains, the air is clear and generally free of significant levels of unnatural contaminants, though on occasion it is deteriorated by smoke, haze, and odor which drift in from the Phoenix metropolitan area or from the southern California metropolitan area. The air quality of the area is protected under the Clean Air Act (69 Stat. 322, July 14, 1955) as amended and supplemented.

Between the White Tank Mountains and Liberty Substation, the atmospheric quality varies from poor to good depending on daily and seasonal weather patterns. During December, January, February, and March, low inversion layers frequently trap pollutants in the lower atmosphere cutting visibility significantly. In summer, insufficient air movement periodically traps dust and smoke within the Salt River Valley reducing visibility in the Phoenix metropolitan area.

High winds, haboobs and duststorms, including numerous "dust devils" along the entire route of the transmission system, add naturally to deterioration of air quality and visibility. Oftentimes the fugitive dust occurring naturally due to wind action exceeds the National Ambient Standards for this area. The present levels of ozone produced by the corona effects of the existing transmission lines are undetectable as described in Section III.C.2.b.

G. Water 42

The portion of the Sonoran and Mohave Deserts in which the transmission system will be located has no perennial streams on the alinement except the Colorado River. Numerous ephemeral desert washes flow only after heavy rainstorms. These storms, with runoff usually lasting less than 1 day, produce flash flooding and erosion. To determine for design purposes, the storm flows of high peak rates but low volume, recourse is made to hydrometeorological prediction techniques of rainfall intensity for frequency of return occurrence, and runoff based on soil and topographic conditions of the watershed drainage area. The major drainages are normally dry for long periods. Because of infrequent flow and small quantities of runoff, stream gaging stations have not been installed generally, and hydrologic records are incomplete or nonexistent for attempting to quantify the annual runoff or storm extents. The water quality of the rivers in the area is protected under the Act of June 30, 1948 (62 Stat. 1155) as amended and supplemented.

Ground water is available at varying depths, mostly in the range of 100 to 500 feet, in alluvial material along the transmission system. The shallowest depths to water are under and adjacent to major stream channels within the basins. The search for potable ground water in Eldorado Valley has been unsuccessful. For development of the Eldorado to occur, an adequate and acceptable source of water will have to be obtained.

H. Noise 41, 100, 101, 125

In open desert areas, natural sound is generated by animals, wind, thunder, and rain. Presently, the most common noises resulting from man's activities in these areas are railroad traffic, the use of the existing highways, an occasional airplane, and off-road vehicles (such as jeeps or motorcycles). The Noise Control Act of 1972 (86 Stat. 1234, October 27, 1972) authorizes the establishment of noise standards for the nation.

Corona creates some slight sounds that are inherent with the overhead transmission of power at high voltage, and this is sometimes noticeable from the existing lines in the area. This sound level is affected by weather conditions due to the air density and is more noticeable during periods of high humidity.

I. Ecological Interrelationships

The transmission system will begin in the Mohave Desert in southern Nevada and end in the Sonoran Desert near Phoenix, Arizona, in the Basin and Range Province of the Southwestern United States. The Mohave Desert is a drier desert than the Sonoran Desert because of a relatively small amount of summer rain. The Sonoran Desert to the south and east is a hotter and more tropical desert that has both summer and winter rainy periods. Owing to the critical dry summer months, the vegetation of the Mohave Desert is predominantly small shrubs while that of the Sonoran Desert is characterized by a high percentage of trees such as paloverde, mesquite and ironwood. The lack of summer moisture is also evident in the more sparse wildlife population of the Mohave Desert.

As the amount of rainfall increases (particularly during the summer months), the vegetation and wildlife of the Sonoran Desert become more dense, and significantly so in or adjacent to washes. The area through which the transmission system will traverse is mostly remote and appears as a relatively natural desert except where livestock grazing reduces the annual forbs and grasses. The public use of this area for hunting, mining exploration, World War II military maneuvers, communication and energy transmission and transportation and general recreational exploring with off-road vehicles has left marks on the remote areas.

Pioneer wagon roads, off-road trails, and modern highways have altered the natural vegetation patterns (Figures 44, 45, 46, and 47). The vegetative alteration is characterized by an increase in riparian-type growth in the trail path of wheel ruts or on the upstream side of cross-drainage control structures for the current road system. Below these structures a reduced and confined drainage pattern is reflected in a drier and more sparsely vegetated desert plain. This change in vegetation has also had a marked effect on desert wildlife distribution. In some areas, the erosion control and borrow areas are producing weed seed that are providing more feed for doves and other birds.

Although the desert is a fragile environment, the biotic community has the ability to cope with severe temperature and drought conditions. Rainfall is sparse and unpredictable and the fauna and flora have adapted to long drought periods. Especially well adapted are plants such as the creosote bush which has small waxy leaves and the cactus family which is leafless or in some cases has very small leaves that eventually fall away from new-growing stems. Desert plants, such as mesquite, can adapt their root systems to function as deep watering phreatophytes or shallow-watering xerophytes. Saguaro and barrel cactus have a great capacity to store water permitting survival during droughts. Desert grasses and annuals produce a seed crop that can lie dormant for years or spring to life almost overnight after rains. This occurrence was particularly noticed during the spring of 1973 after the unusually wet winter. The desert grasses and annual forbs have winter and summer seasonal adaptations that require the proper climatic conditions.

Because of a hot, dry climate, many of the desert animals have a crepuscular-nocturnal way of life. These animals include owls and bats, rodents such as kangaroo rats and pocket mice, kit fox, skunk, badger, raccoon, ringtail, and most desert snakes. During the day, these animals are found under rocks, in rock crevices, under branches and logs, in trunks and stumps of trees and cacti, among clumps of desert undergrowth and litter, and in underground holes. Many animals come out of these protective environments only at night to search for food. Other animals, such as the antelope ground squirrel, come out of their holes during the light hours to quickly grab food and return. Most birds and lizards are only active during daylight hours. This day and night shift of desert animal life activity has increased the number of species of desert wildlife by making it possible for various species to exist together in an area without direct competition.

A significant factor in animal distribution and number of particular species is the occurrence of a water supply. In most of the desert area through which the transmission system will cross, the primary natural source of permanent stable water is found in a few adjacent natural tanks, depressions, seeps or springs in mountain areas, or in the Colorado River. Seasonal variations of water in individual tanks and depressions tend to disperse the concentration of wildlife in the vicinity and thus protect the desert from overutilization. In recent years, rainwater catchment and storage reservoirs, wells and windmills, earth tanks, and detention dams have been used. These watering points have encouraged animals to range further from their normal environments around natural water sources.

J. Landownership and Use

The desertland has undergone many changes as the result of man's use and misuse, and the evidence of these uses can be observed nearly everywhere. These land uses are the transmission systems and their maintenance roads, highways, agricultural and mining activities, off-road vehicle use, and urbanization which have permanently changed the desert landscape. These land alterationsactivities have at times increased erosion over that due to natural processes because of the sparse vegetal cover and low precipitation in the area.

The most natural areas are those most isolated from the communities and include the Buckskin Mountains, Cactus Plain, and portions of the Ranegras Plain and Hassayampa Plain. The land close to the more urban areas has received the most use and misuse.

1. Landownership Status 102, 103, 137

The required right-of-way for the transmission system and appurtenant facilities falls within a variety of ownerships, including Federal, State and private lands, as shown on Table 5, and Figures 50, 51, 52, and 53.

About 264 miles of the total right-of-way length are parallel to existing transmission line rights-of-way. The Federal land is largely undeveloped and is leased for grazing purposes. One mile west of Davis Dam the transmission line enters the southern part of the Lake Mead National Recreation Area which is under Reclamation withdrawal and administrated by the National Park Service. The transmission system will cross approximately 21 miles of land in Nevada reserved for the State of Nevada under P.L. 85-339, as amended. This land is administered by the Bureau of Land Management until transfer through purchase by the Division of Colorado River Resources, State of Nevada. Most of the privately owned land that will be acquired is in the vicinity of urban and agricultural developments. The major portion of this land is near the Colorado River or the Liberty Substation.

a. Range Fire Control

During most years, fire hazard in the area of the transmission system is low due to an insufficient density of dry vegetation to carry a fire.

The range fire control programs for land along the transmission system fall under several jurisdictions as described below:

BLM Land. - Fire control and suppression are generally accomplished by personnel of the Bureau of Land Management aided by the Forest Service or Bureau of Indian Affairs under cooperative agreements. The Bureau of Land Management in Arizona has working agreements with the counties and the Arizona National Guard when additional assistance is necessary to combat a larger fire.

State Land. - Fire suppression on Arizona State land at the present time is being accomplished under a cooperative agreement with the Forest Service under the Clarke-McNary Act (1929), section 2. Many of the fires are controlled by community fire departments although there are no agreements between them and the State. The land reserved for the State of Nevada is administered by the Bureau of Land Management.

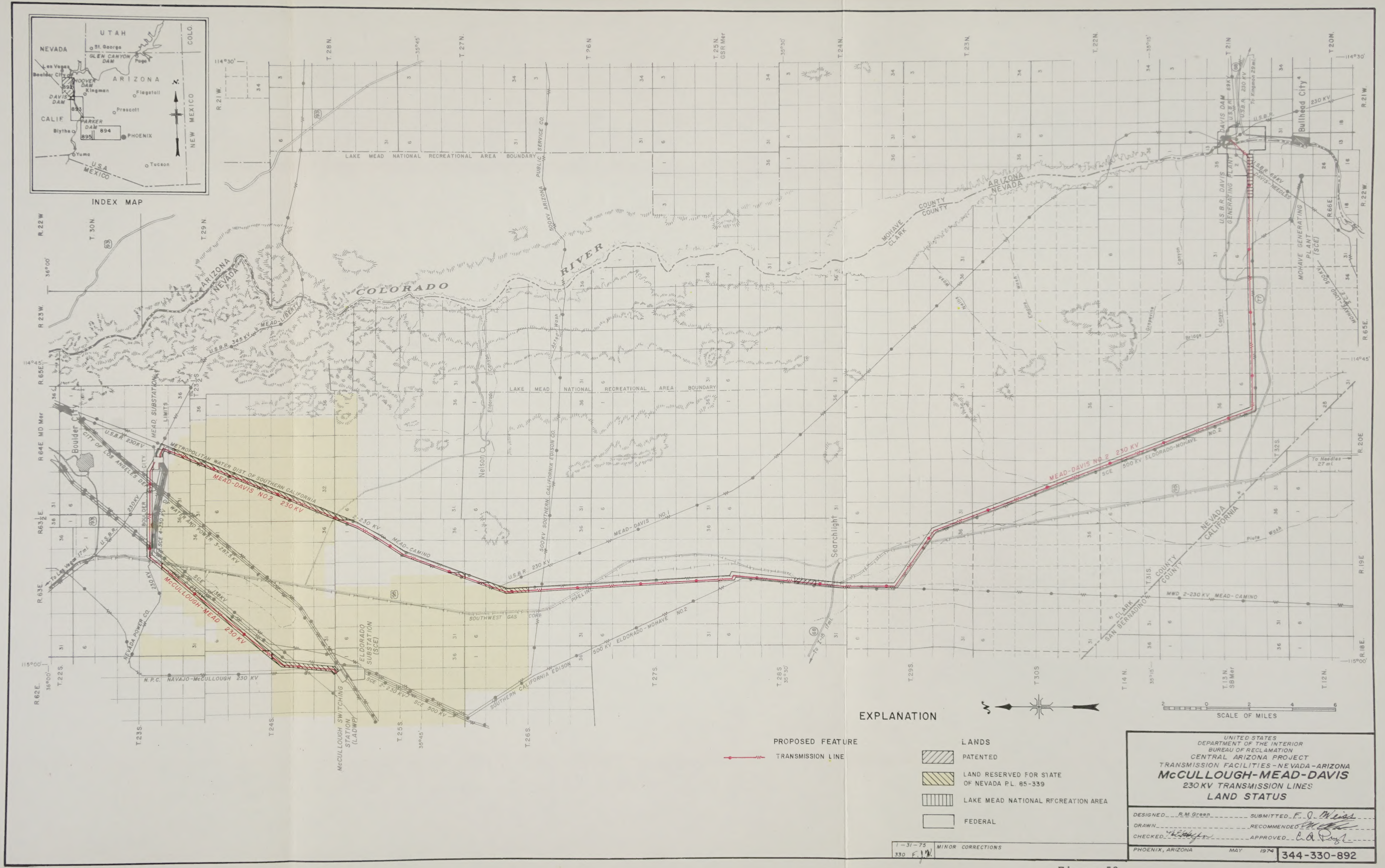
2. Land Use Pattern

The pattern of development and land use varies widely from place to place, depending on topography, water supply, mineral areas, and transportation routes.

The main categories of land use in the area through which the transmission system traverses are undeveloped, agricultural and urban areas.

a. Undeveloped Areas 132

The undeveloped land along the right-of-way is open desert range. The primary economic use of the land is for grazing cattle. The carrying capacity of the desert range increases during wet spring months, but normally averages one cow or less per 400 acres annually.



EXPLANATION

PROPOSED FEATURE

TRANSMISSION LINE

LANDS

▨ PATENTED

▧ LAND RESERVED FOR STATE OF NEVADA P.L. 85-339

▥ LAKE MEAD NATIONAL RECREATION AREA

☐ FEDERAL

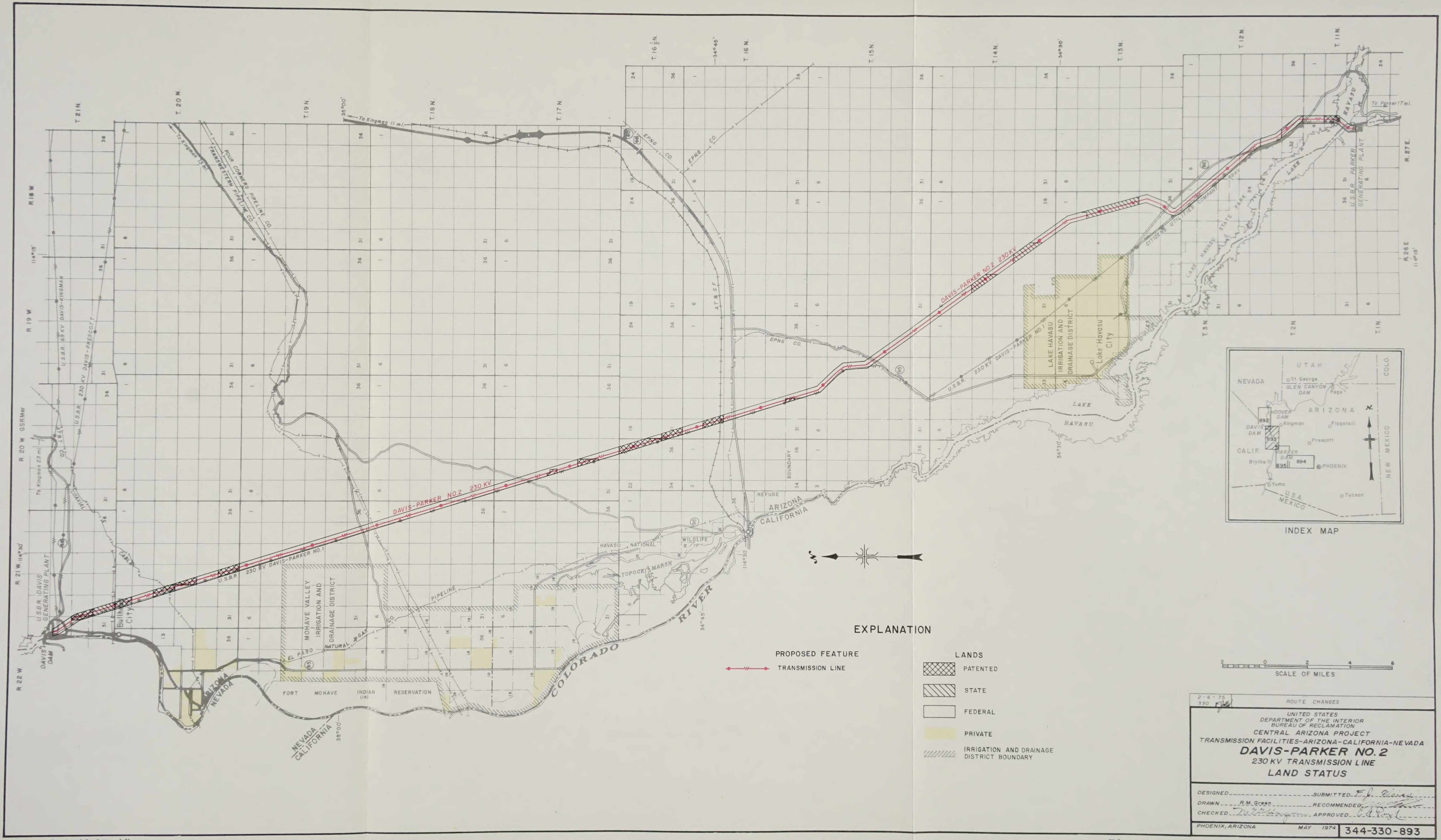
1-31-75 330 F.J.W. MINOR CORRECTIONS

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES-NEVADA-ARIZONA
McCULLOUGH-MEAD-DAVIS
230 KV TRANSMISSION LINES
LAND STATUS

DESIGNED R.M. Green SUBMITTED F. J. Weiss
DRAWN RECOMMENDED
CHECKED APPROVED
PHOENIX, ARIZONA MAY 1974 344-330-892

Interior - Reclamation, B.C., Nev. 3-75

Figure 50



EXPLANATION

PROPOSED FEATURE

TRANSMISSION LINE

LANDS

▩	PATENTED
▧	STATE
☐	FEDERAL
🟨	PRIVATE
▨	IRRIGATION AND DRAINAGE DISTRICT BOUNDARY

2 0 2 4 6
SCALE OF MILES

2-4-75
330 FJW
ROUTE CHANGES

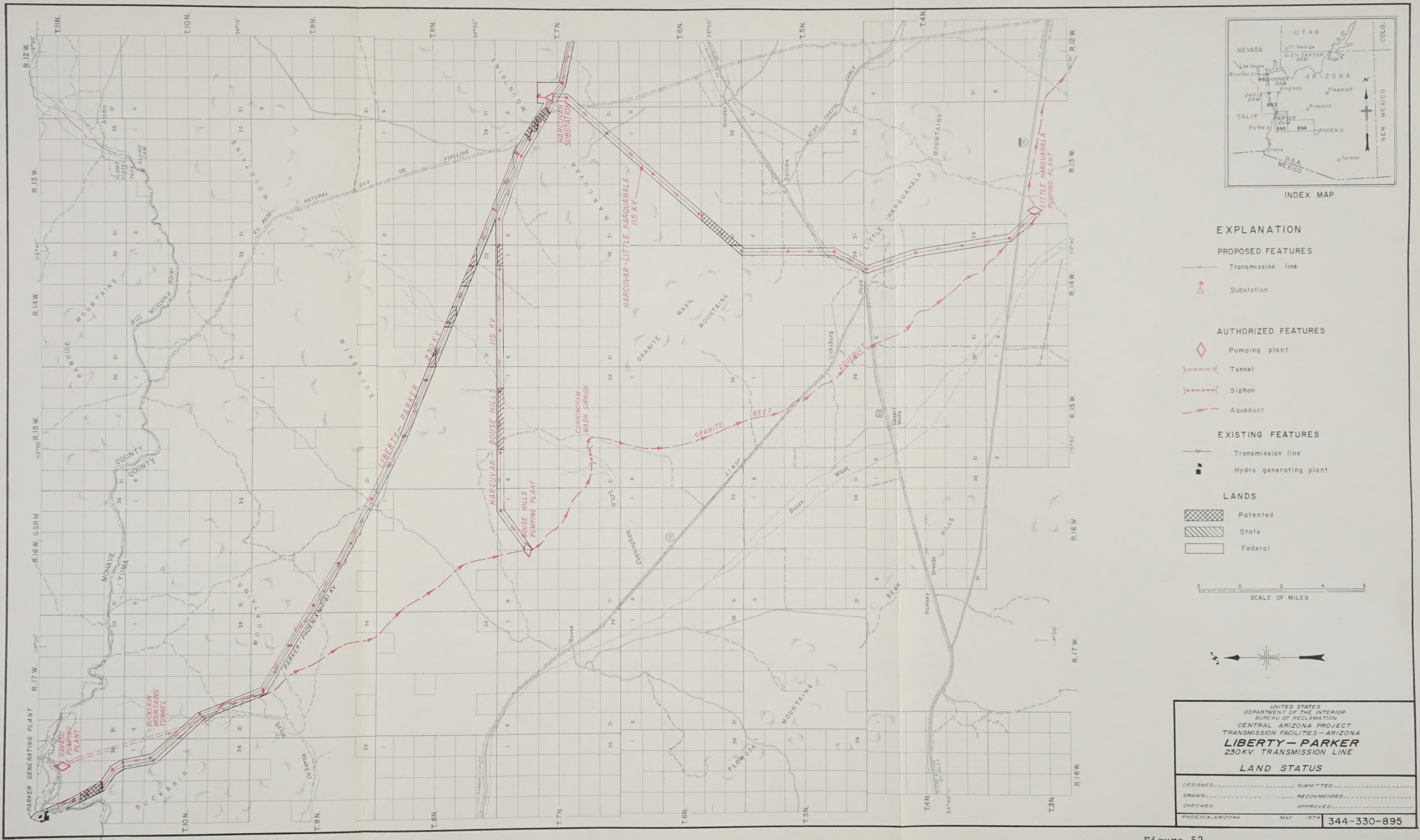
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES-ARIZONA-CALIFORNIA-NEVADA
DAVIS-PARKER NO. 2
230 KV TRANSMISSION LINE
LAND STATUS

DESIGNED
DRAWN R.M. Green
CHECKED
SUBMITTED F. J. Weiss
RECOMMENDED
APPROVED

PHOENIX, ARIZONA MAY 1974 344-330-893

Interior - Reclamation, B.C., Rev. 3-75

Figure 51



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES — ARIZONA

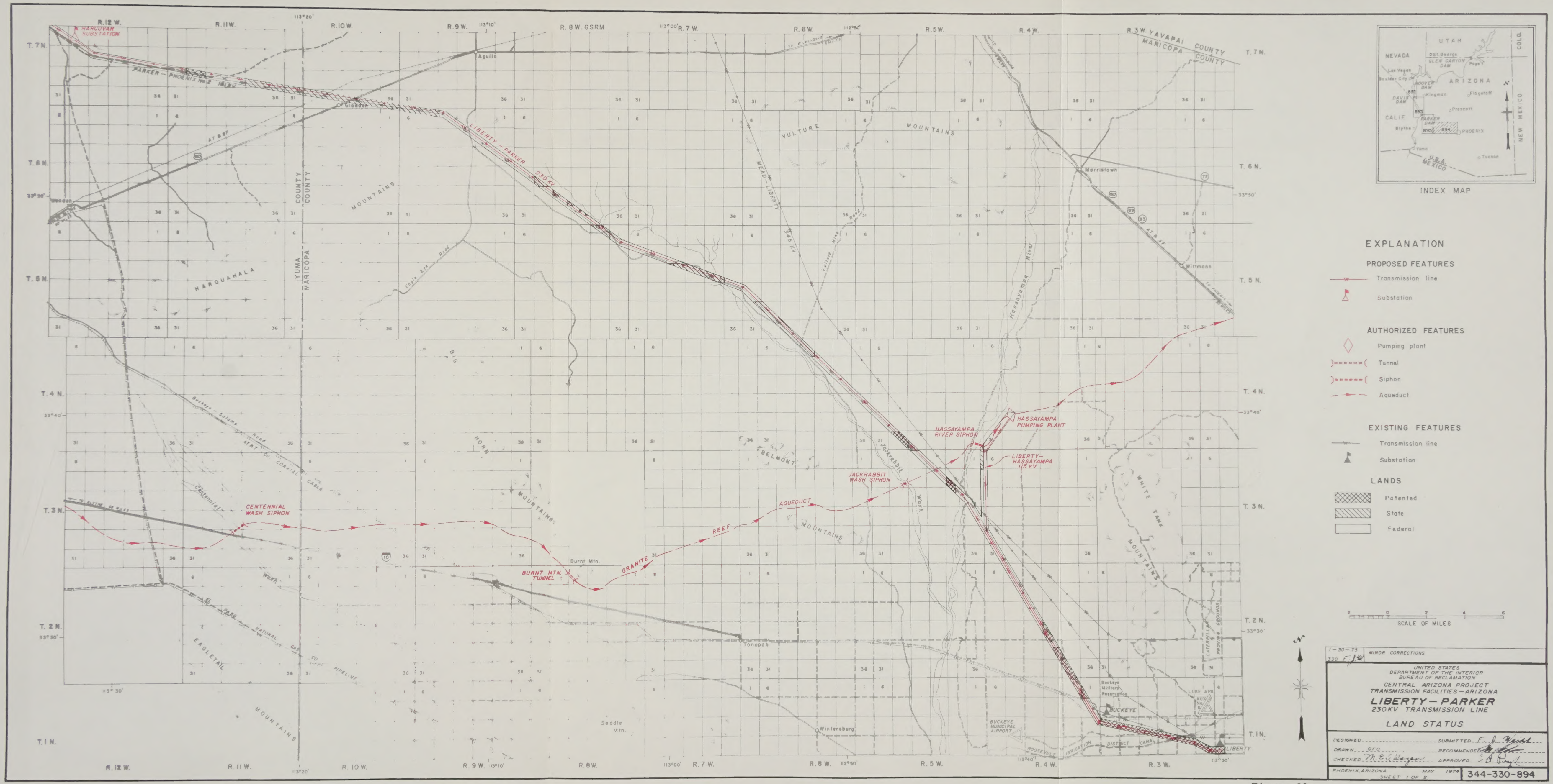
LIBERTY — PARKER
230KV TRANSMISSION LINE

LAND STATUS

DESIGNED ________ SUBMITTED ________
DRAWN ________ RECOMMENDED ________
CHECKED ________ APPROVED ________
PHOENIX, ARIZONA MAY 1974 344-330-895

Interior – Reclamation, B.C., Nev. 7-74

Figure 52



EXPLANATION

PROPOSED FEATURES

Transmission line

Substation

AUTHORIZED FEATURES

Pumping plant

Tunnel

Siphon

Aqueduct

EXISTING FEATURES

Transmission line

Substation

LANDS

▩ Patented

▨ State

☐ Federal

SCALE OF MILES

1-30-75 330 F.J.W.	MINOR CORRECTIONS

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES – ARIZONA
LIBERTY – PARKER
230KV TRANSMISSION LINE

LAND STATUS

DESIGNED ________ SUBMITTED F. J. Weiss
DRAWN GFO ________ RECOMMENDED
CHECKED M. E. Hagen ________ APPROVED

PHOENIX, ARIZONA MAY 1974
SHEET 1 OF 2
344-330-894

Figure 53

The principal mineral interests are copper, manganese, gold, silver, lead, titanium, tungsten, pumice, and scoria. Although sand and gravel are available on the transmission line right-of-way, most deposits are small and of low quality, and are remotely located. The U.S. Bureau of Mines reports mineral production in 1971 from Clark County, Nevada. Data on production from the Searchlight District is not available for individual mines or claims.

b. Urban Areas

The transmission system will pass through the developed urbanized areas with no disturbance to private dwellings. These areas include the Lake Havasu Travel Trailer Village about 4 miles north of Parker Dam and a small residential area of mobile homes south of Parker Dam. The alinement will be routed around Lake Havasu City in an area of low hills to reduce the visual impact on the city.

c. Irrigated Areas

Two miles of the transmission line length are through irrigated land west of the Liberty Substation (Figure 14). This land is intensively farmed in the typical crops of the area.

d. Industrial

Other than mineral claims mentioned earlier in this section, no industrial complex exists within the transmission system right-of-way. Publications of the U.S. Bureau of Mines for the States of Arizona and Nevada indicate mineral production in the areas surrounding the proposed alinement of the transmission line. No producing operations are known to exist on the proposed rights-of-way.

e. Recreational 94, 102, 104-107, 132, 133, 135, 136

Recreational use of the desert and urban-desert areas through which the transmission system will cross is very light except for the area where the lines approach Davis and Parker Dams and is largely limited to horseback riding, motorcycling, dune buggying, and limited hunting for desert mule deer, varmints, small game and birds.

The Bureau of Land Management has reported an increase in recreational activities on desertland in the Ranegras and Hassayampa Plains mainly as a result of new BLM roads and the construction of I-10 through the area.

The transmission system will pass through 2 miles of the Lake Mead National Recreation Area in Sections 10 and 11, T. 32 S., R. 66 E., MDM, in Nevada. The legislation establishing the Area provides for a right-of-way for the construction of this transmission system. The route that will be along the remote southern boundary of the recreation area will not disturb the present recreational activities of hiking and motorcycling. The National Park Service has proposed to change the status of this area to a wilderness area designation as described in the draft environmental statement DES 74-3. The change will have no effect on the transmission system under the provisions of the proposal.

The transmission system will also cross the Lake Havasu State Park north of Parker Dam. The crossing in the desert will be in a remote area of no organized recreational activity.

f. Military

During World War II, the United States Army established a desert training area in southeastern California and most of Yuma County in southwestern Arizona. This area was used by foot troops, motorized and mechanized armored vehicles, and air and artillery units. In addition to maneuver use and cross-country traffic, artillery impact areas for live-round artillery practice were established. National Guard maneuvers and training have occasionally used portions of the area along and adjacent to the Colorado River near Parker Dam.

g. Transportation Rights-of-Way

Along the transmission system there are, in addition to the highway and road system rights-of-way that are crossed, transportation rights-of-way for various entities, that include railroads, gaslines, telephone, coal slurry and other electric transmission and distribution lines.

3. Land Use Planning 47, 102, 103, 132, 133, 137

The proposed transmission line, although primarily located in Arizona, will cross a variety of landownerships and planning jurisdictions in three states. Federal, State and local agencies with planning jurisdiction over portions of the right-of-way have been notified of the proposal pursuant to Office of Management and Budget Circular A-95 and have been sent copies of this statement for review and comment. Those agencies owning the lands and therefore having land use planning responsibility for lands along the alinement are identified on Figures 50-53. The following is a breakdown of the jurisdictions involved.

a. Bureau of Land Management 102, 103, 119, 132, 137

(1) Arizona - The Parker-Liberty segment will cross four BLM planning units: Havasu, Harcuvar, Black Mountains and Vulture. Liaison is being effected with BLM's Phoenix and Yuma District offices and the Havasu City Planning Office concerning transmission corridors in planning for these units. The Vulture Unit is currently the subject

of a BLM planning study, which includes transmission corridors, and Reclamation is coordinating with BLM in this proposal. The existing Mead-Liberty 345-kV line and the Parker-Phoenix 161-kV line cross the Vulture Unit, as will the Granite Reef Aqueduct. In addition, some land in the Vulture Unit is the subject of proposals for various types of development.

The Davis-Parker segment will cross the Havasu and Black Mountains Planning Units. The proposed line will parallel the existing Davis-Parker 230-kV No. 1 line except in the vicinity of Lake Havasu City, where it will detour away from the city to avoid the developing area in and around the existing subdivided area. A cooperative Federal-State study has identified potential new urban areas along or near the Colorado River. Feasibility for development of such areas over the next 50 years is still under consideration and certain factors, including water supply and wildlife management, are yet to be assessed in this regard. Reclamation is coordinating with Federal, State, and local agencies, since some of these areas under study are crossed or influenced by the existing Parker-Davis No. 1 and/or the proposed line where it detours around Lake Havasu City.

(2) California - Approximately 1.2 miles of transmission line will traverse land in California. This occurs when the Davis-Parker segment crosses Lake Havasu above Parker Dam enroute to the Parker Switchyard and on the Parker-Liberty segment as the line exits from the Parker Switchyard and crosses the Colorado River below Parker Dam.

This land is presently under the jurisdiction of the Bureau of Land Management but has been permanently withdrawn for Reclamation purposes as part of the security area for Parker Dam.

(3) Nevada - The McCullough-Mead-Davis segment of the transmission line will cross BLM's Stateline Planning Unit in southern Nevada. Coordination is being maintained with BLM's Las Vegas District Office with respect to alinement of the line. Planning within this unit has reached a point whereby individual resource objectives have been identified in the preparation of a management framework plan. BLM has indicated these individual objectives will now be combined into a draft of an overall management plan which will be available for public review.

b. National Park Service [133]

Approximately 2 miles of the McCullough-Mead-Davis line will cross through the Lake Mead National Recreation Area which is administered by the National Park Service. Portions of the recreation area have been proposed by NPS to be declared wilderness areas as described in the draft environmental statement INT DES 74-3. However, the 2 miles of line will not intersect proposed wilderness areas.

provided by the river. The town of Parker, Arizona, in Yuma County, was established at its present location in 1905 near a railroad crossing of the Colorado River. The community is presently an agricultural and recreational center located within the Colorado River Indian Reservation which limits the growth capabilities due to a fixed land resource base.

Boulder City, Nevada, was established in 1931 for the construction of Hoover Dam, and much of the present population is related to the activities of the dam or Lake Mead. It contains the offices of the City of Los Angeles Department of Water and Power (the major operating agency for the non-Federally operated production facilities of the Hoover Powerplant), National Park Service (Lake Mead National Recreation Area), Southern California Edison Company, Bureau of Mines, the Lower Colorado Regional Office of the Bureau of Reclamation, and operating offices of Reclamation for Hoover Dam and the Lower Colorado River.

Searchlight, Nevada, is a historic mining community. Mining activities are continuing at the present time in the Eldorado and Newberry Mountains to the east.

Salome and Wenden, Arizona, are small agricultural communities which have experienced a decline in business activities due to the construction of I-10 which bypasses these communities. Formerly their location on the main Phoenix to Blythe, California, highway brought considerable tourist traffic through the area.

Buckeye in Maricopa County, Arizona, was founded in 1889 as a farm trading center and is presently the agricultural center of the western part of the county.

The 1970 census reports the population for the following incorporated areas and unincorporated areas as:

Community	Population
Buckeye, Ariz.	2,599
Bullhead City, Ariz.	3,200
Lake Havasu City, Ariz.	5,300
Parker, Ariz.	1,948
Boulder City, Nev.	6,066
Searchlight, Nev.	422

L. Historical and Archeological Factors 3, 75-80, 108, 115, 131, 138, 141, 162

The Bureau of Reclamation programed and obtained an archeological inventory of the transmission system route location in cooperation with the National Park Service (Arizona Archeological Center in Tucson). The survey in July 1973 of the Mead-Davis-Parker portion of the transmission system was contracted to the Southern Branch, Nevada Archeological Survey, University of Nevada, Las Vegas, and performed by George A. Bondley, staff member, under the supervision of Richard H. Brooks. The survey in February and March 1973 of the Liberty-Parker, Harcuvar-Little Harquahala and Harcuvar-Bouse Hills transmission lines was contracted to the Department of Anthropology, Arizona State University, Tempe, Arizona, with Alfred E. Dittert, Principal Investigator.

The surveys were 200 to 250 feet in width to insure that sufficient area was inspected. The inventory surveys located a total of 6 historic sites and 27 prehistoric sites. Appendix C, Table 7, is a listing of the archeological sites found along the alinement and recommended mitigation measures. The State Historic Preservation Officers for Nevada, Arizona and California may elect to comment on the significance of the sites located on the alinement. The Granite Reef Aqueduct Final Environmental Statement (FES 72-5) includes the archeological survey information for the areas of the underground power transmission line for operation of the check structures. Sections III.B.2.c., IV.C.3., and VI provide additional information on quality of and evaluating impacts upon these resources.

The following descriptions of objectives and field procedures are taken from the reports of the two archeological surveys to indicate the intensity of coverage by this reconnaissance. From the Arizona State University Report the following has been extracted.

> "The primary objectives of this survey were: (1) the recording and evaluation of the significance of all archaeological resources and their potential for contributing information about archaeological problems in southwestern Arizona; (2) the development of cost estimates for the recovery of data from each of the significant sites identified, together with a recommended program of studies necessary to mitigate adverse effects resulting from the project; (3) suggestions for changes in the proposed right-of-way in order to conserve sites of National Register quality, if these should be found; and (4) an appraisal of the adverse effects that might have been incurred as a result of previous powerline construction before archaeological clearance by the Government became standard practice. The last objective was established since the existing Parker-Phoenix 161 KV Transmission Line No. 1, presently occupying approximately 109 miles of the proposed right-of-way, was built some 40 years ago. The present project afforded a unique opportunity to appraise the possible adverse effects of the original construction.
>
> "The entire right-of-way was surveyed on foot or from a slow-moving vehicle beginning at the Liberty Substation and working west. The connecting segment of the 230 KV

line, from Liberty Substation to the point of intersection with the extant 161 KV line near the White Tank Mountains, some 10 miles in length, was walked, since roads do not exist along the proposed route. Access to the major portion of the proposed route of the 230 KV line was by means of the existing transmission line access road along the present Parker-Phoenix 161 KV Transmission Lines Nos. 1 and 2. The lines from the Harcuvar Substation to the Little Harquahala and the Bouse Hills Pumping Plants were surveyed on foot and by jeep. Throughout the survey particular attention was given to major drainages, such as the Hassayampa River, Centennial Wash, and Cunningham Wash. These drainages were all inspected on foot. In addition to the proposed transmission line right-of-ways, access routes for construction were inspected whenever possible.

"Approximately 175 miles of right-of-way were surveyed using the described methods of transportation during ten man-days of field work. Actually the area covered was considerably greater, because the nature of the terrain along the two pumping plant lines necessitated a great deal of backtracking to make crossings of numerous drainage channels. The majority of time in the field was devoted to survey of the 230 KV line.

"The substation site will cover an area 200 X 200 feet. A 45-minute search of the area revealed no archaeological remains. In Cunningham Pass itself are numerous abandoned mines cut into Pre-Cambrian metamorphic deposits.

"At a point called "The Jumpoff" (T. 10 N., R. 17 W., Sec. 12; USGS Black Peak, AZ, 1959, 15' Quad.), Giers Wash descends steeply (some 700 feet) into a narrow canyon where several caves are located. These caves are apparently "bubbles" formed in limestone. They contained no evidence of prehistoric occupation. From Giers Wash to Parker Dam itself the transmission line route crosses essentially bare rock slopes overlooking the Colorado River.

"An additional 2-mile line, which will run from Parker Dam to the site of the Pumping Plant at Lake Havasu, was also checked for archaeological remains. None were encountered."

From the University of Nevada, Las Vegas, Report the following has been extracted.

> "The width of the area surveyed along the transmission line right-of-way was 200-250 feet to insure that sufficient area was covered. The total number of days of survey, according to our records, was 15 days of initial survey plus three days additional time in checking sites. Further intensive resurvey mile by mile of the transmission line right-of-way is not recommended."

The National Register of Historic Places has been examined and no listed sites are present. The Federal Register has been examined for notification of potential pending nominations and no sites have been identified. The Arizona State Historic Preservation Officer (SHPO) advised that the State of Arizona had no sites proposed for nomination along the route. A copy of the archeology reports for the transmission system had been provided the Arizona State Historic Preservation Officer prior to publication of the draft environmental statement.

The California Clearinghouse procedure resulted in no comment being submitted by the SHPO indicating that the California review found nothing worthy of response. The absence of comment must be construed as clearance by that officer. This is supported by the lack of any evidence found in California during the UNLV survey.

The Nevada State Historic Preservation Officer had advised that there are no sites in Nevada for which nominations to the Register are being prepared or have been submitted. The Arizona Archeological Center advises that sites in the Searchlight Mining District, Nevada, and the Oatman 1 through 9 sites should be evaluated for determination of register quality.

CHAPTER III

IMPACTS OF THE PROPOSED ACTION

III. IMPACTS OF THE PROPOSED ACTION

A. Introduction

To deliver power to the pumps of the Granite Reef Aqueduct, a 333.6-mile transmission line system will be constructed between the McCullough Switching Station in southern Nevada and the Liberty Substation near Phoenix, Arizona. Approximately 84 miles of this line will be within Clark County, Nevada; 249 miles in Mohave, Yuma and Maricopa Counties, Arizona; and 1 mile in San Bernardino County, California. Of the total length, 264.3 miles will be adjacent and parallel to or will replace existing lines and will have a different effect or impact on the environment than the 69.3 miles of new alinement that will be required.

1. Definitions for Impact Evaluation [1-3]

The evaluation of environmental impacts is dependent on definitions, criteria or standards, and an adequate and comprehensive knowledge of the subject. Impacts may be beneficial, adverse, or unquantified. Definitions outlined in the overall CAP statement and also used in this statement to maintain continuity are:

Beneficial environmental impacts are those that directly or indirectly improve the environment.

Adverse environmental impacts are those that directly or indirectly degrade the environment.

Unquantified environmental impacts are those whose effects are unknown, have not been tested, or may be the result of some other action but attributed to this action.

The environment includes the interaction of climate, soil, and biotic factors that act upon any living organism. Environment also includes the aggregate of social and cultural conditions that influence the life of an individual or community.

2. General Statement of Impact [1, 23, 119]

The proposed transmission system will have varied impacts upon a number of different aspects of the environment. For purposes of this section on the overview of feature impacts and as stated in the overall environmental statement on the CAP, the impacts have been divided into two categories: (1) impacts on natural resources; and (2) impacts on people. The impacts on natural resources will have secondary impacts on the human environment as well. Impacts more directly affecting people will in most instances indirectly affect the natural resources in the project area.

This chapter discusses or quantifies the impacts that the construction and operation of the transmission system will have on man and his surroundings.

B. Direct Impacts Related to Construction

1. Impacts on Man 1-3, 47-49, 100, 114, 119

Powerline and substation erection is considered a specialized activity requiring trained workmen. It is unlikely the local labor force in most locations along the system alinement has the skilled manpower to support such an activity, and in all probability most of the workers will be from outside the area. Primary areas of labor force supply could be Phoenix and Las Vegas.

A typical segment of the transmission line will be scheduled for a construction period of 2 years and will provide employment ranging from about 10 persons in the first 6 months to 70 during the final year. A typical work schedule could be as follows:

a. Six months - tower siting crew
b. Six months - footing construction
c. One year - tower erecting and conductor stringing

A schedule of the nature indicated above would be able to complete approximately 60 miles of line in the 2-year period. Staging is generally on a 15- to 16-mile length basis. Storage, assembly and parking locations are then moved to facilitate the construction program.

During construction of the transmission facilities, minor service interruption may be experienced by power customers of the communities along the route. These outages are scheduled during offpeak hours and should be less than 6 hours in duration.

In locations where the States of Arizona and Nevada, the Bureau of Land Management, and the National Park Service regulations permit use of the desert for recreational purposes, such as driving of off-road vehicles and hiking or hunting, such use will be temporarily restricted for site safety only in the immediate area of the construction.

The Lake Havasu Travel Trailer Village on the Arizona shore of Lake Havasu will have a reduced building site area due to restrictions for right-of-way width. No additional right-of-way will be required in the Parker Dam residential area where the existing line will be replaced. No mines are being worked on the right-of-way. Existing mining claims must be adjudicated and valid claims purchased.

The alinement for the transmission line crosses the right-of-way used for power distribution, communication cables, pipelines and railroads. Above-ground users include Citizens Utilities Company, Southern California Edison Company, Metropolitan Water District of

Southern California, Arizona Public Service Company, Nevada Power Company, City of Los Angeles Department of Water and Power and the Santa Fe Railroad. Underground are cables owned by AT&T as well as pipelines operated by Black Mesa Pipeline, Inc., Four Corners Pipeline Company, Transwestern Pipeline Company and El Paso Natural Gas Company. Permission and crossing agreements from present users preclude structure site locations close to crossings.

a. Davis to Parker 230-kV Segment

The initial phase of construction of the transmission system will be for the segment of the system generally east of the Colorado River between Davis and Parker Dams. Seventy miles of the line will be in Arizona and approximately 1 mile in California. Construction activity will temporarily affect the area for a period of approximately 2 years. The influx of construction personnel may have some effect on the communities along the Colorado River since these recreation-oriented communities are geared to seasonal fluctuations in population. Year-round construction personnel coupled with the seasonal tourism may lead to sporadic overcrowding of the existing facilities.

Interference with the normal flow of street and highway travel will be noticeable at shipping points and at transmission line highway crossings. Parker, Arizona, and Needles, California, will be railroad receiving points for much of the equipment associated with the construction with a resultant increase in heavy truck traffic on State Highway 95 between Parker or Needles and the construction areas. No highway travel disruption is foreseen as road guard structures are erected as the line is constructed across the roads. Between Davis Dam and Parker Dam, there will be six highway crossings: at the intersection of State Highways 95 and 68 just south of Davis Dam; a crossing of Interstate 40 about 6 miles east of Topock; State Highway 95, 10 miles north of Lake Havasu City, and 10 miles south of Lake Havasu City; and two more crossings of State Highway 95, one 14 miles and one 16 miles south of Lake Havasu City. The line will also parallel the highway for about 2 miles at a location about 15 miles south of Lake Havasu City and construction work will be visible to the highway traveler. Where the line crosses Lake Havasu near Parker Dam, there should be only limited disruption of boating and other recreational activities during construction. Construction of the lake crossing may disrupt recreational activities from one to two weeks.

Temporary visual impacts associated with the construction will result from the movement of machinery and equipment on the access roads. Increases in airborne particulate matter associated with the activity will be visible particularly from highway crossings and where the line parallels highways. Normal Reclamation construction procedures as discussed in Chapter IV will minimize this impact.

The interval of construction activity will range from 1 day to 2 weeks on a nonuniformly scheduled basis. The increase in the noise level from construction activity will have different effects on those individuals residing in the Lake Havasu Travel Trailer Village, based upon their individual tolerances to noise. This development is being constructed adjacent to the transmission line right-of-way, as shown on Figure 22.

b. Parker Dam Switchyard to Havasu Pumping Plant - 230-kV Line 2

Along the south shore of the Bill Williams arm of Lake Havasu, construction work will be visible to the traveler driving west toward Parker on State Highway 95, as well as those boating in the vicinity. At this location near the Havasu Pumping Plant, for a distance of approximately 1/2 mile, the line will be an underground cable. This type installation will require a trench and a leveled clearing to accommodate the equipment necessary for the transition from the overhead to underground conductor.

c. Parker Dam Switchyard to Liberty Substation via Harcuvar Substation - 230-kV Line 3

Subsequent construction phases of the transmission line construction schedule will be influenced in time by national program commitments. The contemplated second phase will include the link between Parker Dam on the Colorado River and the Liberty Substation near Phoenix, Arizona. Through this area a total of approximately 119 miles of 230-kV transmission line will be constructed that will replace an existing transmission line of lesser capacity and be adjacent to another existing line. About 75 miles of 115-kV radial feeder lines will be constructed, 19 miles of which will be suspended on towers of the 230-kV line.

The direct impacts from construction of the Liberty-Parker line will be similar to those described for the Davis-Parker area, but of a different intensity. Although this segment of the transmission system involves the greatest amount of construction activity, its topographic location and remoteness from travel routes will allow very little of the construction work to be evident to the public.

The Liberty-Parker line will cross State Highway 95 adjacent to Parker Dam and U.S. Highway 60 between Gladden and Aguila. The Harcuvar Substation to Little Harquahala feeder line will cross U.S. Highway 60 near Harcuvar between Hope and Salome, and Interstate 10, west of the Little Harquahala Mountains and east of the Vicksburg access road. A motorist traveling on I-10 (see Figure 33) will be able to observe construction activity along the west slope of the Harquahala Mountains. None of the other major highway crossings will provide a view of the construction except for the actual crossing activity and tower erection closest to the highway. Major highways will be used for transporting equipment and machinery. The impact of additional trucks to these highways will be negligible inasmuch as the roadways are in constant use as east-west links between Phoenix and the major cities of California.

Unlike the communities along the Colorado River where population fluctuation is a way of life, the communities along the Liberty-Parker line will experience an impact from the influx of construction personnel for the transmission facilities as well as the Granite Reef Aqueduct.

Construction of the Parker to Liberty section of the system will take about 4 years, and the communities of Parker, Bouse, Vicksburg, Hope, Salome, Wenden, Aguila, and Buckeye may experience a need for increased services. Recreational and educational facilities, providing for housing, utility service of water, power, telephone, sanitation, and waste disposal, as well as food and clothing suppliers and auto service stations will receive the greatest impact from the temporary population increase. Mobile home parks will be a likely choice for living locations. The reduction in economic activity subsequent to construction will influence these communities but, because the Granite Reef Aqueduct construction will span approximately 10 years, the appearance and disappearance of transmission line construction crews will, overall, have little effect (refer to Final Environmental Statement, Granite Reef Aqueduct, FES 74-5).

The 230-kV line will replace the existing Parker-Phoenix No. 1 161-kV line that passes through a mobile home residential area in Arizona just below Parker Dam on the Colorado River. At the present time these residences are the only ones adjacent to the right-of-way along the Liberty-Parker alinement. Wood poles that now carry the existing line will be replaced with fewer structures of steel. Approximately 400 less structures will be required.

For a distance of 2 miles from the south side of the Roosevelt Irrigation Canal northeast of Buckeye, Arizona, to the Liberty Substation, construction at each tower site will result in a minimal interference of normal farming practices. Although construction work will be contained within right-of-way limits, it will have a permanent impact on approximately a total of 1/4 acre of farmland at the structure sites. Acreage within the right-of-way may continue to be used for farming subsequent to construction depending upon the crop.

d. McCullough-Mead-Davis 230-kV Transmission Line 133

The McCullough-Mead-Davis Dam segment of the transmission line system will take about 2 years to construct and will probably be the last section of the system to be constructed.

The new line will cross U.S. Highway 95 south of the intersection of U.S. Highway 93 and will be parallel to existing transmission lines. Adjacent to other lines, crossings will also be made over State Highway 60 near Nelson; State Highway 68 east of Searchlight; and parallel to and across State Highway 77 west of Bullhead City, Arizona. The impacts of visual esthetics and noise will be slight at highway crossings because of the short duration of activity at each of the locations.

Although the last portion of the Mead-Davis No. 2 line is routed through the southern tip of the Lake Mead National Recreation Area for about 2 miles, little or no impact will be felt by those engaged in recreational activity in the area. The closest patrolled and recognized camping area is 1/2 mile north of the Colorado River crossing of the line to Davis Dam. The temporary safety and restrictive measures for the protection of the public during the construction period may inconvenience some who are accustomed to the complete freedom of use of the access roads to these recreational areas under present National Park Service regulations.

e. Summary 1-3, 47-50, 124, 125

Generally, the construction of the transmission line system for the Granite Reef Aqueduct may create local esthetic impact, and Regional and local economic impacts. Impacts which may be considered adverse by some may be considered problematical or beneficial by others. Safety of the public is always a consideration when construction involving men and equipment is conducted in populated areas. Residents of the Lake Havasu Travel Trailer Village and the mobile homes at Parker Dam will be most affected by construction activities. The occasional use of explosives in excavation will result in inconveniences to nearby residents and delays to the highway user. The contractor will be required to provide adequate protection to persons and property.

Some interruption of recreation will exist for short time periods. Increased employment and economic activity will be more apparent along the Colorado River and in the Salome area. Nearly 2,000,000 man-hours of direct employment will be required for the construction of the transmission line system for the Granite Reef Aqueduct. Secondary employment impacts will involve those associated with the manufacture and construction of the equipment and machinery to be installed, and other employment associated with service industries for the construction force.

2. Impacts on the Environment

The influence of the construction of the transmission system has been previously discussed as it relates directly to man. The natural environment will also be affected by the construction. This part of the environment includes vegetation and wildlife as well as land, air and water.

a. As it Relates to Land, Air and Water

(1) Land - The construction of a transmission line produces a linear structural impact. The construction of a second, third or fourth line is an incremental effect. The effect produced by construction upon the immediate area of activity is discussed below. Construction will generally be contained within an approximate 75 to 150-foot right-of-way width for 333.6 miles. Nineteen miles of the 333.6-mile right-of-way length will be occupied by the east end of the 230-kV Parker to Liberty

line as well as the 115-kV distribution line to the Hassayampa Pumping Plant for a total of 352.6 circuit-miles of overall system length. Ownership of this right-of-way is as follows:

Federal land	233.6 miles
National recreation area	2.0 miles
State-owned land	60.9 miles [1]
Privately owned land	33.1 miles
Federal owned/State administered	4.0 miles
Total	333.6 miles

The construction of access roads generally has a greater impact than the construction of the transmission line system. Approximately 70 miles of new access roads will be required with the use of approximately 265 miles of existing roads. Figure 42 shows an existing line with attendant access road. Roads may leave the transmission line right-of-way and in rough terrain be located in relation to the topography. Easement rights or fee simple right-of-way for such roads will be required. New roads constructed in the mountainous areas will create additional scars on the landscape. The new roads may be more susceptible to erosion and because of compaction from traffic may be slow to revegetate. Natural washes may be used for access to tower sites, but where roads cross the washes, fill or ramps may be required to bridge the streambed. Culverts will be installed where needed.

Approximately 10 acres of desertland will be required for construction of the Harcuvar Substation and about 3.5 acres for the 1-mile-long attendant access road. Here, the leveling will be a balancing of cut and fill, but the clearing will create a scar on the generally undeveloped area. The area is presently crossed only with jeep trails and access roads to range areas. The location and vegetation are shown on accompanying Figure 12.

Approximately 0.5 acre of land will be permanently cleared of vegetation near the Havasu Pumping Plant to accommodate a cable spreading yard for the Parker-Havasu 230-kV radial transmission line.

Concrete footings for powerline structures require excavation and backfilling. In locations where the material excavated for the footing is not of sufficient quality to be used for backfill, select backfill will be obtained to make up this deficiency from small borrow areas located on the transmission line right-of-way and may leave small scars to the landscape. Excavated waste material will be mounded against the tower footings or spread evenly around the tower site.

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[1] Approximately 21.8 miles of this land are owned by the U.S. Government in Eldorado Valley, Nevada, but held in reserve for the State of Nevada under the provisions of P.L. 85-339, as amended.

The contracts will allow the contractor to mix concrete for tower footings although in all probability he will contract for its delivery from local ready-mix companies. Approved sources of aggregates for this use, however, are located in the Osborne Wash, Cunningham Wash, and Agua Fria River areas. Excavation for aggregates, though under controlled conditions, leaves a residual pit area that can be only partially restored.

Staging or equipment storage areas and locations for concrete batch plants will be located along the right-of-way. These sites, about 16 miles apart, will be occupied for varying lengths of time. Activity will shift from one to the other as construction progresses. These will be the locations for receiving trucked-in material, some structure assembly, and concrete mixing. To reduce the adverse impact of scarring to the land, effects of oil and fuel spillage, and the littering of construction material and packaging associated with the use of the area by the crews, the contractor will be required to restore these areas to as near a natural condition as practicable.

(2) Air - Air pollution from dust, smoke and odors associated with the operation of the construction equipment will exist in the area of activity. Workmen commuting between worksite and residence on unsurfaced access or county roads will add to the dust load because of the increased traffic volume. Heavy equipment-laden trucks delivering materials to the staging area will also contribute to this pollution. The construction of new roads will be primarily limited to those serving the radial lines emanating from Harcuvar Substation and in a more limited manner, near the Hassayampa River area. These new roads will also contribute to the dust problem but not significantly. The exhaust from diesel-powered engines used in construction equipment contributes to air pollution. Though strictly limited by health and safety requirements, diesel exhaust will exist but will be localized in areas generally remote from population densities. Some dust may be put into the air if each tower footing excavation is cleaned out with a pneumatic device. Natural air movement will help to further dissipate the concentrations.

(3) Water - Water that the contractor will require for construction purposes is expected to be transported to the worksites by truck. Greater quantities will be required for dust control than for concrete mixing or other construction work. Erosion sometimes results on slopes and fills from overwatering roadways although contractors strive to avoid this problem because of the inconveniences and increased direct costs it creates for them. Any runoff from roadway watering would be absorbed in the dry alluvial wash channels.

With the exception of the crossings of the Colorado River at Davis and Parker Dams there are no perennial streams on the transmission line alinement. The washes carry area runoff only during and after storms.

b. As it Relates to Vegetation and Wildlife

During the construction period, local disturbance of vegetation and wildlife is anticipated, particularly at the temporary staging and equipment storage sites.

(1) Vegetation - Clearing at each tower site, along the new access road, and for each spur road leading from the access road to the tower site will be required. Tower site clearing that will result in a permanent loss of vegetation may not be necessary except for the foundation footings although some additional losses can be expected from the use of equipment to erect the steel towers and string conductor. Clearing of the spur roads will create a temporary loss of vegetative covering. The desert vegetation is sparse except adjacent to the ephemeral stream channels. Spans permitting, tower sites will be located far enough away from the stream channel banks to prevent damage to wash bottom vegetation and to avoid flood hazard as determined by flood design frequency studies. Tower sites will be designed so as not to impede 50-year frequency floods.

Clearing will be accomplished where material will be received by truck, stored and assembled, and at designated areas where assembly crews will park private vehicles. The compaction of the topsoil by men and machinery may necessitate that the area be scarified to accelerate regrowth.

The Harcuvar Substation, as well as the attendant 1-mile-long access road, will require complete and permanent clearing.

The impact on the vegetal communities can only be estimated prior to construction. The quantification of the impact can be based on recorded field data of specie density, frequency and ground cover, or on observation experiential estimation procedure by electrical facility construction people with experience on the Mohave and Sonoran Deserts. The observation experiential estimation procedure is probably as accurate as projections based on recorded field data due to the diversity of vegetation communities and hypothetical unforeseen construction activity impacts.

The amount of vegetation effected by construction is estimated at 15 percent of new land to be subjugated, and 20 percent on right-of-way that already exists, or crown cover on an equivalent of about 870 acres of the total rights-of-way for the transmission system. Part of this loss will be temporary due to the crossing of machinery over plants which may only damage them. The regrowth of these plants may resume almost immediately after the crossing of the equipment. The seeds in the soil of the annual herbs and grasses may be displaced but not destroyed and, given the proper amount of rainfall, will germinate and grow with little or no change resulting from the operations which have occurred.

The permanent loss of vegetation is due to road, footing, and permanent facility construction. This loss will be most noticeable. The loss of topsoil in the road area will, through the displacement of herb and grass seeds, reduce the chance of revegetation in these areas and will add additional years to the time the revegetation will require under normal conditions.

The alinement is located principally in a creosote bush/bursage community as described in detail in Section II.D. Construction activities will reduce this community by 522 acres of permanent vegetation or 60 percent of the total number of acres of vegetation imparted by the project.

The next largest vegetation community to suffer a permanent loss are the tree communities which are located throughout the alinement. The tree communities of paloverde, smoke, and mesquite are generally located near ephemeral washes and these will suffer from equipment travel and construction. Only the smaller trees would be able to rejuvenate themselves with little or no damage after equipment passage. These communities would represent approximately 25 percent of the permanent vegetation loss or 218 acres.

The smallest loss will occur to the cacti, yucca, agave, and ocotillo communities which represent 15 percent or 130 acres of the total permanent vegetation loss. These communities are the most susceptible to damage and generally the most difficult to reestablish. Some of this group, such as the prickly pear and cholla, can most likely withstand some disturbance but the larger plants, such as saguaro and barrel cactus, cannot withstand any damage and take many years to reseed and grow. Many plants of this group are protected in Arizona and notification of the Arizona Agricultural and Horticultural Commission will be necessary to facilitate their salvage and removal to other locations before clearing operations begin. Generally, these plants will be lost to the transmission system alinement and will be extremely slow to vegetate within the disturbed area. Transplanting vegetation on the alinement without an irrigation system would not be successful under normal desert conditions.

Since the permanent access roads will not be used on a regularly scheduled basis subsequent to construction, natural regrowth in the roadways will be permitted to take place. The areas will not be scarified, however.

Natural revegetation could conceivably take years but improvements in machinery and construction techniques have reduced the required amount of vegetation removal. The vegetation disturbance surrounding the Southern California Edison Company's 500-kV transmission line towers erected about 5 years ago shown by Figure 19, is less apparent than that disturbed in the proximity of the Metropolitan Water District's 25-year-old line as shown in Figure 18.

(2) Wildlife - As the construction proceeds, any habitat destruction will affect wildlife. Many species of the larger terrestrial fauna will abandon an area where humans are present, particularly at staging and storage areas. When human activity is concentrated for long periods of time at one location, it is possible that behavioral patterns of animals oriented or accustomed to a local area will be altered.

There would be some invertebrates such as scorpions, ants and spiders that would be destroyed in clearing operations and by heavy equipment transporting materials. Invertebrates such as moths, butterflies, wasps, bees, gnats and flies may be destroyed by collision with moving equipment and cars going to and returning from the worksites.

There should be no impact on fish populations as the result of construction activities.

Some amphibians and reptiles will be relocated or lost. However, this impact will not be significant to the total population of the area.

Construction activity will have little influence upon the habits of the desert mule deer and bighorn sheep and other mammals along and adjacent to the alinement. Bighorn sheep populations have been identified in the Buckskin Mountains, the Harquahala Mountains and the Black Mountains in Arizona and in the Newberry and Eldorado Mountains in Nevada. A typical sheep habitat is shown on Figure 24. Deer are typically sparse in numbers and scattered in the open desert environment but are found in greater numbers in the desert riparian growth area adjacent to washes. The impact by construction of the transmission system upon mammals is expected to be minimal because of the short duration of activity in any location. It will cause the relocation or loss of some small mammals.

The temporary disturbance of desert bird species, such as the cactus wren, gilded flicker, and Gila woodpecker, will be negligible and limited to the staging and storage areas where they may be present. The noise, dust, and increased human presence related to construction of the 1/2-mile underground 230-kV line north of Parker Dam might cause a minor disturbance to the great blue heron colony on Heron Island if construction is done during the mating and nesting season. In the spring of the year, approximately 15 pairs of great blue heron nest on Heron Island located about 0.25 mile offshore and approximately 0.5 mile from the work area.

There should be no impact on threatened species due to construction activities. The only exception to this would be the remote possibility that an occasional Gila monster (SU) might be killed by heavy equipment during the construction period if the animal is on a road when the equipment passes.

The impacts of the transmission line construction on the wildlife of the area are difficult to quantify due to a lack of definitive studies of the generally sparsely populated desert habitats. An ongoing study of these impacts is being carried out by biologists at Northern Arizona University for the Arizona Public Service Company (APS) on a 500-kV transmission line of the Navajo Project Southern Transmission System. One of their study sites is located in the typical saguaro-paloverde Sonoran Desert with the majority of the ground cover consisting of bursage, creosote bush and annual herbs. The study area consists of three 50- by 150-foot plots directly on the disturbed area, and a duplicate or control set of plots 200 to 400 feet off the disturbed area but on similar terrain with similar vegetation. This vegetative community is similar to that which will be traversed by the eastern half of the proposed Granite Reef Aqueduct Transmission System. It is likely that the impacts on wildlife will also be similar. It must be noted that the conclusions reported are tentative and are contained only in progress reports submitted to APS. Also, no known studies of a similar nature have been accomplished in a Mohave Desert setting, and the conclusions drawn may not be applicable to the western half of the Granite Reef Aqueduct Transmission Line.

The APS study indicates that an almost total annihilation of arthropod (insect) communities occurs on access roads due to loss of vegetation. However, there was no evidence of an invasion of exotic arthropods or major changes in the overall distribution of native taxa.

Data collected for the APS study show a variable impact on adjacent bird populations. After construction there were increases in three species. House finches increased by 374 percent, mockingbirds 100 percent, and western meadowlarks 74 percent. Six species decreased significantly. These species were the black-throated sparrow (50 percent), Brewer's sparrow (68 percent), cactus wren (24 percent), curve-billed thrasher (39 percent), mourning dove (57 percent), and verdin (24 percent). A total of 23 percent of all of the bird species that occurred on the site were affected in some way by the disturbance.

The work concerning impacts on mammals was confined to rodent populations. The biologists collected seven species of rodents. In order of their abundance, they were the Merriam kangaroo rat, Bailey pocket mouse, whitethroat woodrat, deer mouse, cactus mouse, southern grasshopper mouse, Arizona pocket mouse, and the cliff chipmunk. The studies by Northern Arizona University are being continued in order to obtain a better data base for reliable quantification of the impacts of a transmission line that traverses a desert ecosystem. However, some tentative conclusions were made from the data available which are considered to be pertinent to the construction of the Granite Reef Aqueduct Transmission Line. These tentative conclusions are as follows: (1) overall density and diversity of rodents will not be significantly affected, however, the density of individual species changes, (2) access roads and survey strips appeared to have less impact on rodent populations than larger, broader disturbances such as the clearing of tower sites, and (3) adult-juvenile ratios and reproductive activity may be affected adversely. The impact of the research study sampling and collecting of specimens upon the population of species within the research study sites has not been separately evaluated.

c. As it Relates to History and Archeology

23, 77-80, 108, 115, 131, 138, 141, 145

The construction of the transmission line system for the Granite Reef Aqueduct will not have a significant impact upon the historical and archeological resources. A survey for resources along the alinement initially proposed has been completed. The degree of detail can be seen from the quoted portions of the reports in Section II.L. Reports on the initial survey by the Department of Anthropology of Arizona State University and the Nevada Archeology Survey of the University of Nevada indicate six historic and 27 prehistoric sites were located. Eighteen sites were reported in Arizona and 15 sites in Nevada that were not previously reported in the Granite Reef Aqueduct, Final Environmental Statement FES 74-5.

The investigating archeologists stated in one report that none of the sites were to be considered of national register quality and the other report was silent with regard to quality. The Arizona State Historic Preservation Officer states that there are no register sites in Arizona or that no sites are currently being considered for nomination to the register. For other than evaluation measures or alinement changes to locations not examined, no further study has been recommended for those sites not identified in Appendix C, Table 7.

From information excluded from the reports previously received but attached to the reports as appended material,and in the National Park Service comments there is an indication that some of the Searchlight Mining District area may have some potential for register quality. This would have to be sustained following evaluation of the field testing. Field testing activities have been initiated to obtain archeological clearance during the nomination and evaluation review process including the coordination with holders of interests in the land.

With the recommendations that archeological clearance be given for the examined alinement between Parker and Liberty and for the minor clearance work identified in Appendix C, Table 7, the impact upon archeological resources is considered to range from none to possibly significant depending upon the line segment under consideration.

The conclusions and recommendations relating to the archeological and historical resources are best stated in the following statements taken from the reports submitted to Reclamation from the two surveying institutions and the Arizona Archeological Center.

As expressed in the Arizona State University report:

"The reconnaissance survey of the Liberty Parker 230-kV Transmission Line right-of-way, together with the surveys of the 115 kV transmission lines from Harcuvar Substation to Bouse Hills and Little Harquahala pumping plants did not reveal archeological remains which would require a program of study to mitigate the effects of construction of the lines as proposed. No sites of National Register quality were found. The original construction of the Parker-Phoenix 161-kV Transmission Lines Nos. 1 and 2 probably did not destroy information about the prehistory of this area since no evidence of construction disturbance of prehistoric resources was noted.

"It is the field archeologists opinion that the line (both of the 115 kV pumping plants lines) if constructed in the fashion (wood pole structures) and along the route intended by the surveyor will have a very minimal environmental impact.

"It is, therefore, concluded that archeological clearance for the right-of-way should be granted with the understanding that, if major changes in the routes now proposed occur, additional survey will be necessary."

The University of Nevada, Las Vegas, report includes as a recommendation:

"Further intensive resurvey mile by mile of the transmission line right-of-way is not recommended. In fact, except for the few sites that need extensive collecting and/or test-pitting, the remainder of the right-of-way should have full archeological clearance. This means that there will be no cost of recovery for a full field survey, as I feel the completed work, with the additional mapping, collecting and test pitting proposed prior to construction of the line, will fulfill any obligations of the Bureau of Reclamation towards the protection or preservation of sites along this right-of-way."

The National Register of Historic Places has been examined and there were no register sites recorded as of March 11, 1975. The respective State Historic Preservation Officers have not advised that any nominations are in progress for sites along the alinement.

d. Summary

In summary, the impacts to man's surroundings will exist during the 10-year construction period. Some wildlife will be influenced adversely, especially where activity is concentrated which may temporarily disturb their migration patterns and breeding habits. Without protective considerations, the colony of the great blue heron might be affected. About 870 acres of Mohave and Sonoran Desert vegetation along the entire length of the alinement will be disturbed by the construction of 70 miles of new access roads, and tower siting and staging areas. About 0.5 acre of total vegetation will be permanently removed at the tower footings and 14.0 acres at the Harcuvar Substation, its access road and the cable spreading yard at the Havasu Pumping Plant. The effects of the construction on the transmission line are primarily of a temporary nature. Mitigation measures to avoid or reduce the intensity of the adverse impacts will be discussed in Chapter IV.

C. Direct Impacts Related to Operation and Maintenance of the Transmission Line System

Those impacts on man and the environment associated with operation and maintenance of the transmission line system are more permanent than those from construction. Some impacts may lessen and others may increase in intensity, but the esthetic impact of the lines presence will last through the life of the project.

The most obvious adverse impact on man associated with a transmission line installation is esthetic in nature. The permanence of the feature occupying air space appears out of place. This type of esthetic impact will be reduced insofar as possible by utilizing an existing transmission corridor and constructing the line parallel to the existing lines removed from areas heavily populated and within an area already impacted by existing transmission lines. The incremental impact is less than on initial structural impact. The use of nonspecular conductors in lieu of the standard ACSR type conductor is not considered to be warranted when overall evaluation of esthetics and economics is made.

Open space as a natural resource is increasing in value and importance and is therefore of major consideration in the planning for the use of the land for transmission line systems. The esthetic considerations of a powerline are not easily identified or quantified. The areas of greatest impact, however, are more readily discernible and measures are incorporated into the plan to minimize the esthetic disturbance of the present land values. Although there is no general agreement as to what type of powerline structure has a pleasing appearance, it has been shown that lattice-type structures are less of an intrusion on the desert landscape, particularly after aging has reduced the reflective quality of the metallic members. In most instances, the access roads for the transmission line systems have more of a visual impact than the line itself.

The esthetics of use of open space and visual impact are minimized by constructing the line parallel to existing lines remote from areas heavily populated to within an area already impacted by transmission lines.

As shown in Figures 17, 18, and 19, the operation and maintenance of the transmission line segment between McCullough Switching Station and Davis Switchyard will have no appreciable increase in visual impacts or reduction in present land use or value because the area is occupied by other systems. The area of greatest visual impact from this segment of the line will be at the river crossing at Davis Dam. The incremental operation and maintenance activities will have no appreciable effect upon future land use or esthetics.

The esthetic effects on the segment of the transmission line system between Davis Dam and Parker Dam are more apparent than the other portions of the system, because the area is more heavily populated and used by river recreationists. In order to reduce the residential land use and visual impacts to the residents of Lake Havasu City, the bypass in Figure 4 assumes a new route which will require a new access road. The new route will result in a recreational land use impact on the mountainous area to the east of the residential area which is at the present time unaffected by any transmission line. The bypass will also add one more highway crossing to Route 95 south of the Lake Havasu City area.

Because of the contrast of the new 230-kV line running parallel to an old wood-pole 161-kV line between Parker and Liberty, the visual impacts will be especially apparent. However, the remoteness of the area provides few opportunities for the contrast to be viewed, except at the road crossings.

1. Impacts on Man

a. Access Roads

An impact will be the 70 miles of new roads built for construction and maintenance access. These roads will not be maintained after construction as operation and maintenance patrol of lines will be accomplished by helicopter. The existence and prior use of the new access roads by the construction crews will open areas of desert for range management and for those seeking desert-oriented travel and recreation. These new roads will cause an increase in vehicular scars on the desert landscape and increased disturbance to local wildlife as a result of use by off-road vehicle enthusiasts.

b. Electrical Interference

At highway crossings, a motorist may experience low-level audible as well as electrical interference with radio reception. This annoyance is generally limited to the immediate area surrounding the conductors and is the result of corona energy loss. Residents of the Lake Havasu Travel Trailer Village adjacent to State Highway 95 between Lake Havasu and Parker Dam or the residents of Parker Dam should experience no increase in such interference on radio or television over what they now have with existing lines.

c. Maintenance

The monthly fly-by of the helicopter on maintenance inspection patrol can be a moment of adverse distraction. In terms of existing routes of travel and cultural developments, this type of impact will probably be limited to those residing near the Colorado River between Lake Havasu City and Parker. The inspection is performed during daylight hours when the increase in noise level is not as apparent.

d. Farming

The location of approximately 10 towers between the Roosevelt Irrigation District canal and the Liberty Substation near Goodyear, Arizona will result in a permanent impact on 0.25 acre of cultivated land. Some additional crop loss might be experienced should access through cropped fields to the towers be required by maintenance crews to repair major damage.

Aviation obstruction markers will not be installed on the conductor and overhead ground wires except where lines cross other existing lines. The lines could be a hazard to a crop duster flying over the fields through which the line passes.

e. Economic

A commitment of $45,975,000 for construction of the transmission system will be an impact for the 50-year payout period to the benefiting communities. The expenditure will not result in an appreciable increase in operational or maintenance employment or population since the transmission line system will be integrated and will upgrade existing facilities utilizing, to a large extent, presently staffed operating and maintenance crews.

f. Source of Energy 11-13, 23-25, 29

The Navajo Generating Station will be the source of the electrical energy transmitted to the central Arizona service area. The transmission lines will carry the energy to operate the water pumping plants of the Granite Reef Aqueduct system and be a tie-in with other features of the CAP and other systems. An average quantity of 1,100,000 acre-feet of water annually will be diverted by the aqueduct to the central Arizona area to decrease the overdraft on ground-water supplies. Pumping of 1,100,000 acre-feet of water will require consumption of 1,675 gWh of electricity annually. At the Navajo Generating Station this will require consumption of 775,000 tons of coal per year. The impact of the Navajo Generating Station has previously been reported in a final environmental statement, FES 72-1.

By linking the McCullough Switching Station and the Westwing Substation through the Liberty and Mead Substations and the Davis and Parker Switchyards, power from the Navajo Generating Station can be made available for commercial consumer use when the pumps are operating at less than full capacity.

The reliability of the Parker-Davis system will be improved. The addition of a 230-kV transmission line parallel to the existing 230-kV line between Davis and Parker provides backup reliability to the system. Reduction in outages and local community energy problems will be ameliorated by the increased reliability. Future improvements to distribution systems serving communities along the Colorado River will be possible by integrating the Granite Reef Aqueduct Transmission Line System with the existing systems.

The 230-kV line between Parker and Liberty will replace a 40-year-old 161-kV line. Not only will system reliability be improved, but the replacement of the wood-pole structures with steel towers will reduce maintenance costs.

2. Impacts on the Environment

a. Land 114, 119, 133, 137, 161

Over most of the transmission line length the existence of the system may limit but not alter the present use of the land within the right-of-way. In desert areas, the use of the land may be increased as a result of the installation and new roads. Towers will remove from 20 to 400 square feet of land per tower from agricultural use near the Liberty Substation depending on the cropping pattern and harvesting practice of the individual farmer. Farming will continue, however, within the right-of-way area between and adjacent to the towers. Where the line is located near Searchlight, Nevada, some mineral mining is conducted. No mines exist within the present proposed right-of-way, but the presence of the transmission line may limit the area for future prospecting. Underground mining will be vertically unrestricted except in close proximity to the individual towers. The mine access roads may be slightly altered due to structure locations. The Harcuvar Substation removes approximately 10 acres of desert land from other use, and the roads associated with the installation and those serving the pumping plant radial transmission lines will open this desert area to increased recreational use. Where the transmission line crosses rangeland, no restriction on the use of this land for range management will be imposed.

The general status of ORV (off-road vehicle)use on Interior lands will remain the same as it was prior to the issuance of Executive Order 11644, i.e., lands under the jurisdiction of the National Park Service, the Bureau of Reclamation, the Fish and Wildlife Service will remain closed to ORV use unless otherwise designated, and those of the Bureau of Land Management will remain open to ORV use unless otherwise designated.

The monetary value of land can be affected by being adjacent to or within sight of transmission lines, based on the contemplated land use. However, due to the nature of present land use of the area and the transmission line for the Granite Reef Aqueduct being generally parallel to or a replacement of existing lines, there should be little additional impact in this respect. The establishment of a utility and roadway corridor can dictate future land use planning because of the transmission line route. Telephone, gas and public powerlines, as well as Bureau of Land Management and minor State and county road alinements can be located on the right-of-way.

When considered on a long-term basis, construction and operation of the transmission system will have a lasting effect on land use planning within the three states traversed by the line. The following discussion outlines the impacts expected on land use planning in the states affected.

(1) Arizona - Bureau of Land Management planning should not be significantly impacted by construction of the proposed transmission system

in Arizona since the line would use or closely parallel existing transmission line routes for most of its course through the state. A 230-kV backbone alinement section approximately 19 miles long will bypass Lake Havasu City and the existing Davis-Parker 230-kV line, and there is a 6-mile-long departure from the Parker-Phoenix alinement to connect to the Liberty Substation. The Bureau of Land Management and Reclamation are also coordinating the alinement south of Lake Havasu City to avoid or reduce adverse impacts on the proposed Aubrey Hills scenic area of the Havasu Planning Unit. In addition, approximately 16 miles of the 115-kV line to the Bouse Hills Pumping Plant, 27 miles of the Little Harquahala Pumping Plant line and 6 miles of the Hassayampa Pumping Plant transmission line do not parallel existing systems. Coordination with state planning agencies and other Federal and local entities with planning functions will insure that these exceptions to existing routes and the feeder lines to the pumping plants will have minimum impact on land use planning.

(2) California - The construction of the 1.2 miles of the Davis-Parker 230-kV transmission line segment from the Lake Havasu crossing to the Parker Switchyard, as shown on Figure 5, will not adversely affect land planning in the area. This land is presently under the jurisdiction of the Bureau of Land Management, but has been permanently withdrawn for Reclamation purposes as part of the security area for Parker Dam. Reclamation will make a filing with the Bureau of Land Management under provisions of the Act of December 5, 1924, that will reflect the intention of constructing the proposed line.

(3) Nevada - Since the Granite Reef Aqueduct Transmission System generally parallels other existing lines, it is not expected to adversely affect any resource development plans for the area. However, Reclamation is coordinating closely with the Division of Colorado River Resources, State of Nevada, to insure that construction of the system transmission lines will not have an adverse impact on their development plans for Eldorado Valley which have been described previously in Section II.J.3.f.

(4) Federal Recreation Lands - The proposed transmission line between Mead Substation and Davis Switchyard crosses about 2 miles of the southern tip of the Lake Mead National Recreation Area administered by the National Park Service.

In selecting a route for the Mead-Davis No. 2 230-kV line, an alinement was used that would require the least amount of Recreation Area lands and still be economically feasible. Paralleling the existing Mead-Davis No. 1 230-kV line was avoided so that only 2 miles of right-of-way through the Recreation Area would be necessary even though this adds a new transmission corridor segment rather than keeping the alinements together.

The National Park Service has proposed certain sections of the Recreation Area as wilderness areas and has issued a draft environmental statement, DES 74-3, outlining the impacts of its proposal. This environmental statement recognizes the construction of the new Mead-Davis No. 2 230-kV line.

b. Air [31, 134, 144]

The air will not be appreciably affected by the transmission line except that the towers and conductors will occupy air space. This occupancy is a hazard to aircraft illegally flying below FAA allowable altitudes or crop dusters working in agricultural locations.

Ozone generation from transmission lines has been the subject of extensive study in recent years. The results of these studies indicate that only insignificant amounts of ozone are generated.

Ozone (O_3), in conjunction with carbon dioxide (CO_2) and suspended particulate matter is one of the natural pollutants of air. The global background atmospheric concentration of ozone at sea level is between 0.01 p/m (parts per million) and 0.03 p/m, and although ozone has a pungent odor at these levels of concentration it is generally not detected by human senses. However, the additions of only small quantities to this background, resulting in a concentration of 0.05 p/m, can be detected by the human sense of smell and, as such, is a useful signal of its presence.

The two most common ozone-producing phenomena, detectable by the average person, are lightning and electrical sparks. They are short in duration and are not a cause for concern.

Ozone can be produced in the vicinity of extra high voltage (EHV) and ultra high voltage (UHV) transmission lines by corona discharge, a phenomenon of high voltage electric transmission lines. Existing studies on three-phase 765-kV and single-phase 1,100-kV transmission lines were unable to detect traces of ozone above background concentrations either under the line or at reasonable distances from the line. The corona loss of a 230-kV line is substantially lower than for the 765-kV and 1,100-kV lines and will therefore generate far less ozone. Since no detectable ozone attributable to corona discharge was measured from the higher voltage lines, it is unlikely that a 230-kV transmission line will produce measurable quantities.

It is recognized that the natural dust conditions in the desert area through which the transmission line is routed are in excess of the National Ambient Air Quality Standard for Particulate Matter. For this reason it is imperative that proved procedures of dust control be implemented during construction. Measures will be required to limit the number of new desert roads and their use that could contribute significantly to the fugitive dust problem in the future.

c. Erosion

The emergency services of maintenance crews for the transmission line will most likely be required during and immediately after severe storms.

Washes that are usually dry will, during storm periods, carry the storm runoff. Drainage patterns of some washes may be locally affected by maintenance activities with crews passing through them. Local erosion will be negligible.

d. Vegetation

The permanent removal of 14.0 acres of vegetation at the Harcuvar Substation site, service road and Havasu Pumping Plant, and an accumulated total of approximately 0.5 acre at tower sites, as well as the temporary changing growth patterns on construction and maintenance roadways, will affect the vegetation in these immediate locations. No significant impact on vegetation, however, will result from the operation of the transmission line system as it is not expected that maintenance clearing will be required and ground crews will only be used in emergency situations.

e. Wildlife

There will be no direct impacts on fish and invertebrates as a result of operation and maintenance activities as the line will be patrolled by helicopter on a monthly basis. The clearing of vegetation will affect the wildlife in the area to the extent that 14 acres of vegetation-type habitat area are permanently removed. The existence and operation of transmission lines should cause no changes in the migration patterns and other activities of mammals or amphibians and reptiles in the area. The line is, to a large extent, not an uncommon or out-of-place object to the desert animal. In the open range, the line and tower will not be detrimental to livestock.

The operation and maintenance of the transmission line will have no direct adverse impact on the birds of the area. Conductor spacing on the 230-kV system precludes any danger from electrocution for the largest of birds. Occasional nesting in the towers by raptors has been reported with no need indicated to remove the birds. Reported raptor electrocutions have been on lines of the lower distribution voltage range typical of systems with wood-pole construction in rural areas.

Adverse impacts on threatened species as a result of operation and maintenance activities are foreseen as insignificant if actually occurring.

f. Summary

The operation and maintenance of the transmission line system for the Granite Reef Aqueduct will have various direct impacts on man and his environment. The most significant of these impacts is related to the purpose for which the system is constructed - to effect water transport with the power transmitted from the generating station delivery points for use on the Granite Reef Aqueduct and other features of the CAP. Impacts associated with the 334-mile right-of-way include the visual esthetics, limited disturbance of farming operations and land use commitment as well as the commitment of funding. Approximately 4,200 acres of new right-of-way will be required for the transmission lines and the Harcuvar Substation. Of this area, 14 acres will be permanently altered and void of vegetation. The concrete footings for all towers will occupy an aggregate of approximately one-half acre; the Harcuvar Substation about 10 acres, and the substation access road that is 1 mile long, approximately 3.5 acres. The 70 miles of new access roads will alter growth but will not remove all vegetation from 200 acres.

D. Secondary Impacts of Construction and Operation of the Transmission Line System 1-3, 29

The secondary impacts associated with the transmission line system include many of the direct impacts related to the operation of the Navajo Powerplant and the Granite Reef Aqueduct. The system will transport energy produced by the Navajo Generating Station for use by the Granite Reef Aqueduct. Such impacts as the use of coal as a source of energy, increased employment for the operation of the generating station, the mining and transporting of coal, and for providing community service requirements are all secondary impacts in relation to the transmission line system. The impacts of the Navajo Generating Station are discussed in the Navajo Project final environmental statement, FES 72-1. A direct impact on environment as a result of the Granite Reef Aqueduct, but a secondary impact because of the transmission line system, is the delivery of water to supplement groundwater supplies in the areas of benefit. These impacts are discussed in the Havasu Intake Channel, Pumping Plant and Buckskin Mountains Tunnel final environmental statement, FES 73-2, and the Granite Reef Aqueduct final environmental statement, FES 74-5.

The consumption of natural resources for the production of tower components and conductor material as well as the mining and factory employment related to this work are secondary effects due to the transmission line and affect economic resources in other locations.

The acknowledgement that archeological resources are located near the facilities may result in vandalism by some individuals who may utilize the access roads. This is considered a secondary impact.

Ship, rail and truck transportation facilities will be impacted by delivery dates and production schedules. It is estimated that 8,000 tons of metal will be used in tower and other structural construction and 4,000 tons in the manufacture of conductors. There may be 800 wood poles used on the distribution lines to the pumping plants.

Fuel and lubricants to operate the machinery must be allocated for the construction and to some extent the operation of the line. Special oils for use in transformers must come from various refineries throughout the country.

In a sense, each major construction project is a laboratory for the research and testing of new materials and the introduction of improved construction methods and operating procedures. Research and study of this nature is for the purpose of increasing beneficial and decreasing adverse effects or impacts. Many of the changes that result from this innovative investigation are secondary impacts to the environment as a result of the project. If adopted on a larger scale, these changes can create resultant impacts on another area of the community. An example of this relationship of secondary to direct impact is the study of steel-pole use on the 115-kV radial distribution lines from the substations at Liberty and Harcuvar. Engineering studies are exploring the potential of replacing some or all of the wood poles in this design with steel. Although the relative impact to the present environment resulting from the changes in material is insignificant, the study is to determine the degree or reduction of ground crew maintenance patrol, to reduce replacement costs and to reduce the visual effects from weathering. While the secondary impact on the wood-pole industry is minor because of this project, the ultimate large-scale adoption would affect the industry to a considerable degree and would replace the use of a renewable natural resource (timber) with a nonrenewable but recyclable resource (metal).

1. Summary

Secondary impacts are generally related to the consumption of resources and the manufacturing of material utilized in the construction and operation of the transmission line. Secondary impacts which can also be considered are those that have a delayed action impact on future projects because of innovations and design changes leading to improvements of methods and greater effectiveness of systems. Such a condition could occur in the Eldorado Valley, Nevada where this project would add a new line to 12 existing lines of varying major transmission capacities.

E. Unquantified Impacts

Some aspects of the construction of the Granite Reef Aqeuduct portion of the transmission system remain unquantifiable or unmeasurable at this time. Some require additional study and some will become more meaningful as time elapses. This section attempts to recognize that such aspects of the project exist so that methods and procedures can be developed to identify, study and assess them. Others that may become evident in later stages of development will receive similar consideration. The actual influence of the transmission system on these aspects are unquantifiable at this time. Examples of some aspects that will be continuing in nature are presented below.

1. Population Growth Impact [47, 48, 86, 140, 142]

a. Growth in Arizona is projected to increase by 50 percent in 10 years between 1970 and 1980. Population centers of Phoenix and Tucson will be affected the most by this growth.

b. Electrical system reliability improvement will make this growth easier for the utility systems to cope with.

2. Economic Influence of Construction Crews

a. Chapter I details the length of time for construction of each segment and number of men employed.

b. Though the type of construction associated with transmission line work requires a nomadic type work force, crews will reside in communities that provide the best living conditions. They will in all probability live along the Colorado River and commute many miles rather than live in small remote desert communities. Most of the crew personnel will be from cities (especially Phoenix and Las Vegas) so when work is within reasonable commuting distance, they will live at home.

c. The number of personnel hired from local communities and how crews will affect small communities is unquantified and is dependent upon the skills required and employment contractual conditions prevailing between contractor and labor organizations.

d. The affect crews will have on recreation-oriented communities by living there is unquantified.

3. Residences near the Colorado River

To what degree construction will affect residents now building homesites adjacent to right-of-way near the Colorado River is unknown.

4. Land Use Pattern

The exact range of impacts resulting from temporarily increased population in small communities and resultant changes in land-use is unknown, except in general terms as discussed previously.

5. Revegetation

The access roads used for construction will be allowed to revegetate. How long this will take is unknown as it is largely predicated on climatic conditions. Continuing use by range operators, recreationists and others will tend to retard vegetative regrowth.

6. Wildlife

The total range and exact magnitude of effects that the labor forces employed on the transmission system will have on the wildlife populations is unknown.

7. Summary[96, 116, 119, 120, 121, 144-146]

As a result of industrial and municipal growth in the Southwest, power requirements for Arizona, southern Nevada, and southern California are projected to increase. Chapter IX outlines some of the proposals by utilities in the area to meet this forecasted demand.

With each project there will be transmission facilities that will be required to deliver the generated energy to the service area. These new lines will incur similar impacts on the environment of the Southwest as described in this environmental statement. As the routings for these future transmission facilities have not yet been determined, and will only be made after extensive route analysis studies, the cumulative and secondary impacts that the Granite Reef Aqueduct Transmission System will have on the environment with regard to its relationship to these projected lines remains unquantifiable.

CHAPTER IV

MITIGATION AND ENHANCEMENT MEASURES

IV. MITIGATION AND ENCHANCEMENT MEASURES

A. Introduction 1, 2, 3, 27, 28, 100, 106, 124, 125, 128, 129,

The impacts relating to the construction and operation of the Granite Reef Aqueduct power transmission system have been discussed in Chapter III. Many of these impacts are characteristic of transmission lines in general while others are applicable to this project in particular. In order to reduce the intensity or eliminate some of the adverse impacts, changes or mitigation measures are applied. An example of the use of a mitigation measure could be the choice of using low profile structures in the design of substations that, while costing more, reduce the visual impact of the facility.

In order to fulfill the objective of transmitting power, the system must operate efficiently, reliably, and as unobstrusively as possible. In addition, it must be installed and maintained with a minimum of disturbance to the environment.

The stages of development of a power transmission line system include coordination and planning, design, construction and operation. Guidelines are used in each of these stages of development to achieve compatibility of system and consideration of man and his environment. Mitigation guidelines for the development of the Granite Reef Aqueduct power transmission system are: (1) Reclamation Instructions Series 350, for the preservation and enhancement of the environment; (2) Environmental Guidebook for Construction published by the Bureau of Reclamation; (3) Reclamation Instructions for design and construction; (4) Environmental Guidelines published by the Western Systems Coordinating Council, and (5) Environmental Criteria for Electric Transmission Systems by the U.S. Departments of the Interior and Agriculture.

No attempt is being made to monitor the effects this transmission line will have on wildlife of the area. As these new facilities parallel existing lines for 264 miles with only 70 miles of line being constructed through presently undeveloped areas, they will have little or no effect on present wildlife habitat requirements or migration patterns. The transmission line will pass near some monitoring plots that are being set up for monitoring effects of the Granite Reef Aqueduct. These test plots are described in the Granite Reef Aqueduct final environmental statement, FES 74-5. Studies of these areas will give an indication of the influence of the transmission line on the area.

B. Standard Guidelines, Mitigation Measures

As a result of planning and following appropriate environmental guidelines, the route for the Granite Reef Aqueduct transmission line system will have a minimum conflict with present and planned future land use. In the agricultural area near the Liberty Substation (Figure 14), the present activity will not be disturbed except in the area of the towers following construction completion. The route has been planned to avoid steep slopes, to avoid paralleling of highways as much as is practicable and also to utilize existing rights-of-way where possible. In addition, concentrations of population have been avoided where possible.

1. Reclamation Contract and Supervision Procedures

Protection of the environment to minimize the potential adverse effects of construction activities is the responsibility of each Reclamation employee--from the surveyor, geologist, and inspector in the field, to the Construction Engineer, Projects Manager, and Regional Director. The policy of the Bureau of Reclamation for the preservation and enhancement of environmental quality is explained in Part 376 of the Reclamation Instructions, Series 350.

Early in 1973, an "Environmental Guidebook for Construction" was published by the Bureau of Reclamation and has been distributed to all field offices. The book has since been revised in 1974 and is again being made available to field office personnel. This guidebook discusses Bureau of Reclamation concerns regarding certain facets of possible environmental degradation that may be more specifically stated in the construction specifications. For example, most Reclamation construction specifications contain certain standard paragraphs requiring contractors to perform operations with minimum impact on the environment. These paragraphs deal with dust abatement, air and water pollution, noise control, cleanliness of work area, installation of sanitary facilities, landscaping, vegetation protection, historical and archeological resources, and exceptional wildlife colonies or habitat, as well as other items. Also, specific environmental paragraphs are included in specifications on a project by project basis to minimize or eliminate impacts. It may be that such paragraphs will be developed for this project if a recognized need occurs.

The environmental specialists of the Regional and Project Offices will assist the Project Construction Engineer in providing orientation training sessions to construction and inspection forces to heighten their awareness of and sensitivity to environmental factors, and in keeping with Reclamation policy for those areas identified in the environmental impact statement and pertinent specifications requirements.

During and upon completion of each contract, personnel of the staff make periodic and final inspections and prepare reports on environmental aspects, impacts, results, and recommendations for future and further consideration.

2. Access Roads

Construction of new access roads that would leave permanent damage to an area will be avoided if possible. Proper drainage control so as not to divert surface flows from one watershed to another will be provided for any roads that are required and areas that are damaged will be restored. Roads not required for maintenance access will be scarified as necessary to encourage natural regrowth. Slope and soil management will be a guide in the location of roads including those that are not on the alinement.

Specifications provisions will control the construction activities which could cause adverse impacts to the drainage pattern of the area or to wash channels. Restrictions will control unnatural turbidity and any pollutant discharges in areas where water might become contaminated.

3. Borrow Areas

Although it is not expected that extensive borrow areas will be required, such areas when used will be graded and shaped to blend with the adjacent terrain and made to appear similar in nature to the surrounding landforms.

4. Air Pollution Control [134]

Inherent with thunderstorms, windstorms, construction, travel, and other activity in this desert region is an ever-present dust problem. Construction activities in general raise the particulate dust levels at and adjacent to the construction site during the construction period. General construction specifications will require that the contractor provide efficient measures to reduce the dust originating from construction operations. Compliance with standard Reclamation rules and guidelines for construction practices, which includes dust abatement, will limit the amount of dust resulting from construction.

In accordance with specifications provisions and applicable local, State, and Federal laws, air pollution from any construction activities will be minimized. The measures include those that require dust abatement, and regulate noise, burning, and vehicle and heavy construction equipment emissions.

Specific measures will be employed to limit dust contribution in the construction area. Depending upon labor contract provisions, workers may be prohibited from driving personal vehicles on unpaved haul or access roads. All heavily used unsurfaced roads will be patrolled to mitigate dust-creating conditions. These areas will be repaired or treated. Speed limits will be imposed. Existing roads will be used to preclude the construction of a new road. Work and storage areas will be selected that require as little clearing as possible.

5. Safety Measures [124, 125]

Highways and roads subject to interference by the construction work will be kept open, or suitable detours provided and maintained for the public. Barricades, signs and signals and any other necessary precautions for the protection and safety of the public will be provided. Public access to the work areas will not be permitted, and subsequent to construction, security fencing will enclose the substations.

6. Wildlife Protection

The selection of towers and the spacing of conductors are such that they provide no danger of electrocution to raptors. Construction activities within one location will be of such short duration that there should be no permanent effect on the living patterns of wildlife in the area. Compared to present recreational use of the desert area surrounding the Harcuvar Substation site, the weekly inspection by a maintenance crew will have little effect on wildlife.

Scheduling construction in the vicinity of the Havasu Pumping Plant for periods during the nonnesting season of the great blue heron colony on Heron Island has been demonstrated by the construction of the Havasu Intake Channel to eliminate adverse effects upon the colony.

Where the Liberty-Harcuvar-Parker 230-kV line passes through Giers Wash in the Buckskin Mountains, construction activity will be limited during the lambing season for the bighorn sheep.

7. Esthetics

Topographic and vegetative screening will be used to the extent possible to blend the transmission line to the landscape (Figure 54). No permanent clearing will be done except for tower footings, the Harcuvar Substation, and its attendant access road. Temporary clearing for staging and assembly areas, as well as for new access roads to the transmission line, will be done in a manner to permit regrowth. Staging and equipment assembly areas will be screened from public view where possible by landforms and restricted to areas requiring a minimum of leveling.

Galvanized lattice-steel structures will be used on the entire 230-kV line. Consideration is being given to using towers constructed of similar materials on the 115-kV radial transmission lines. After it has been weathered and because of the open construction, this type of structure blends with the landscape. Wood-pole structures that may be used on the 115-kV lines will be colored to minimize visual impacts, and treated for protection against decay to reduce maintenance requirements.

Construction sites, storage and assembly work areas will be maintained in an orderly manner. Temporary protective fences will most likely be of chain-link material and will be used to enclose these areas.

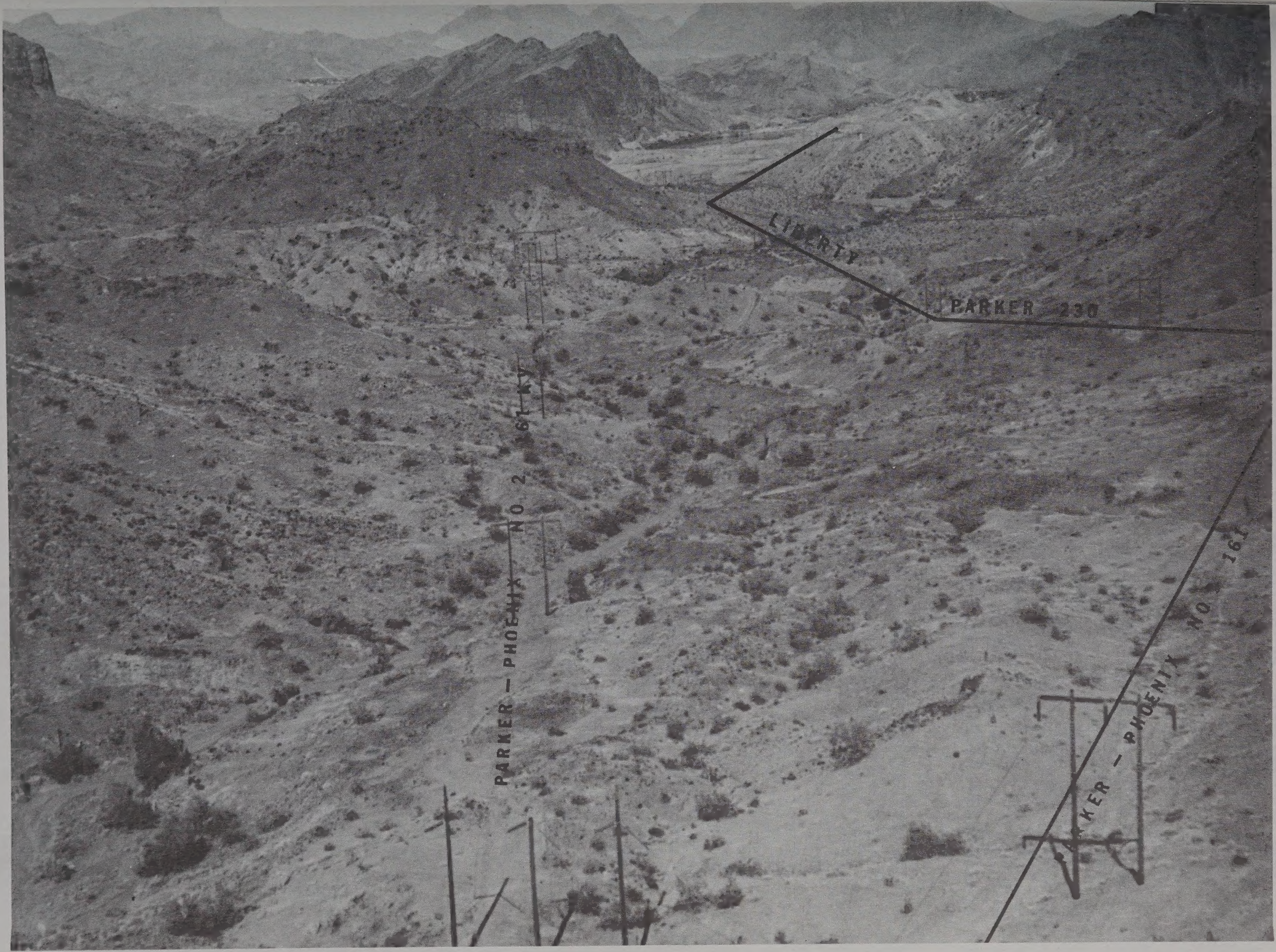


Figure 54. Topographic Screening--Liberty-Parker 230-kV Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. 344-300-01155NA.

Only around the installations of switchyards, substations and similar complexes will permanent security fencing be constructed. The transmission line right-of-way will not be fenced.

8. Archeological and Historical Resources 75-80, 115, 131, 141

Surveys of the cultural resources along the Granite Reef transmission line route were performed in 1973 by the Nevada Archeological Survey, University of Nevada, Las Vegas (Mead-Davis-Parker section), and the Department of Anthropology, Arizona State University, Tempe (Liberty-Parker, Harcuvar-Little Harquahala, and Harcuvar-Bouse Hills sections). A total of 6 historic and 27 prehistoric sites, and a number of isolated artifacts were located. These are individually described in Appendix C, Tables 7 and 8.

In accordance with 36 CFR 800, these sites will be evaluated for their eligibility to be included in the National Register of Historic Places. Should any qualify, then the procedures in 36 CFR 800 will be followed.

C. Special Considerations for Mitigation

As previously discussed, many of the mitigation measures adopted are sound methods of environmental protection and have become standard procedure in the development program of transmission line systems. Circumstances that may cause a system to be unique may also create impacts of a special nature. Means of mitigation appropriate to each situation or circumstance are selected or developed. Generally, this type of action occurs in the planning and designing stage and very often involves the investigation, development and selection of alternatives.

1. Routing 132, 133, 137, 139

In order to reduce the visual impact of a transmission line in a desert setting, mitigation considerations are an important part of planning and design of the route. The proposed route has been selected for the transmission line system for the Granite Reef Aqueduct in coordination with the existing transmission line route. For about 264 miles of the total approximate length of 334 miles, the transmission line will parallel existing lines, creating little additional esthetic impact (Figure 48).

A mitigation advantage was gained by deviating from the parallel concept at Lake Havasu City. Figure 55 shows the existing corridor through the area. A 19-mile bypass is routed behind a low frontal range of hills between the community and the Chemehuevi Mountains so that the line is virtually hidden from the view of the residents. Although the additional visual impact would have been slight, since an existing line now runs through the city, the most apparent effect of the bypass will be that it will not further reduce the subdivided area for community development. Also, disturbances adherent to construction activities through populated areas will be avoided.

Environmental quality protection will be required by the landscaping provisions in the construction specifications. Contractors will be required to exercise care in preserving the natural landscape in the vicinity of the work, and to conduct operations so as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings. Except where clearing is required for permanent structures and for approved construction roads, borrow areas and excavation operations, all trees, native shrubs, and vegetation will be preserved and protected from damage caused by contractor construction operations and equipment.

The construction will necessitate the removal from cleared areas of plants protected under the Arizona Native Plant Act (Arizona Revised Statutes, Sec. 3-901, et seq. - 1972 Supp.). Some species of the Amaryllideceae (amaryllis) and Cactaceae (cactus) families, Fouquieria (ocotillo) genera, Dalea spinosa (smoke tree), and Holacantha emoryi (crucifixion thorn) are the protected plants expected to be found within this area.

The plant species which are protected and do not lend themselves to transplanting or are not desired for landscaping purposes will be destroyed. These plants would be those propagated with bulbs and cacti such as cholla which are not desired for transplanting. The Bureau of Land Management is instituting a program of salvaging desert plants from Federal lands used for construction of public facilities which may lessen some of the losses anticipated above.

The States of Nevada and California are presently studying legislative proposals based on the Arizona law, and upon passage similar arrangements for transplanting can probably be made with agencies in these states.

Existing crews already used for the maintenance inspection of the existing Reclamation lines will be used for patrolling the Granite Reef Aqueduct powerline, resulting in little total increase in existing maintenance costs.

2. Design

For a distance of six-tenths of a mile adjacent to the Havasu Pumping Plant on Lake Havasu, design will incorporate the use of an underground cable to bring power to the pumps. In this way the esthetic visual impact of towers and conductors on the motorists driving on Highway 95, as well as the boaters on Lake Havasu, will be avoided.

Present design studies include the use of wood or steel poles on the 115-kV radial distribution lines from the substations to the

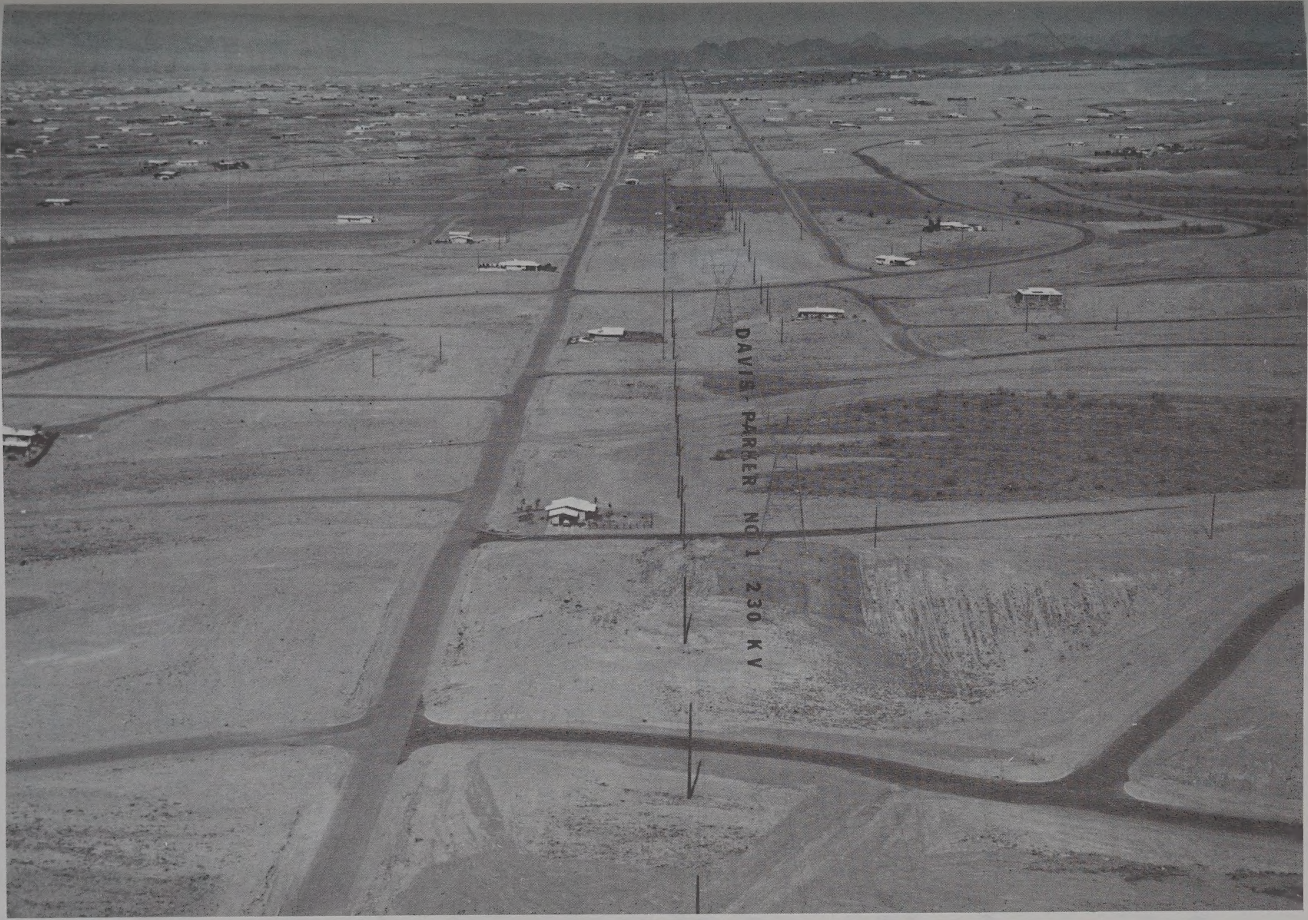


Figure 55. Lake Havasu City, Arizona--View north showing the existing Davis-Parker No. 1 and local distribution system. New alinement length of 19 miles will bypass this community to avoid adverse esthetic environmental impacts--Davis-Parker 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01219NA.

Bouse Hills, Little Harquahala and Hassayampa Pumping Plants. The choice of steel instead of wood poles would lessen the visual effects (as shown on Figure 56), particularly after aging and weathering and, in addition, would reduce the maintenance costs. Since wood poles are subject to rot and require frequent ground inspection, steel towers that permit the use of helicopter inspection patrol reduce the requirement for access roads for maintenance. More extensive vegetation regrowth in the roadways is possible.

Two 161-kV transmission lines now cross the desert between Parker and Phoenix, Arizona. By designing the Granite Reef Aqueduct power transmission line system to be integrated with the existing system, the 230-kV line will replace and uprate one of the 161-kV lines. The new system will not only minimize the visual and esthetic impacts, but will increase power transmission reliability to the communities served by the system. The uprated system will also make available for consumer use power generated by the Navajo Generating Station when the pumps on the Granite Reef Aqueduct are operated at less than full capacity.

While it is difficult to have a substation harmonize with surroundings in a desert setting, every effort is being made to reduce the harshness at the Harcuvar Substation site. The design will be of the low-profile concept and the siting is located to use landforms for screening, as can be visualized from Figures 12 and 13. Special emphasis will be placed on grading and the treatment of slopes to prevent erosion and changes in drainage patterns in the area.

The additions that are made to the Liberty, Mead, McCullough, Parker and Davis Substations and Switchyards will be designed to be compatible with those already in use. This will eliminate a style contrast that often occurs when additions to structures are made.

3. Construction

During field surveys or while excavation operations or other construction activity are being carried out, prehistoric burial sites, foundations, historic and archeological relics and other distinctive features may be uncovered that were not found during the preliminary archeological survey. By provisions of the contract specifications, the contractor will be required to take extreme care to promptly avoid unnecessary destruction of any artifacts and features and delay operations in the area until necessary clearance has been obtained. Under the intent of the National Historic Preservation Act, the State Historic Preservation Officer will be notified when such items are discovered in order that they may be properly evaluated. The Arizona Archeological Center of the National Park Service has provided assistance in identifying the archeological resources along the transmission line alinement. Mitigation measures for archeological resources that have been recommended in the reports submitted to Reclamation are listed in

Table 7, Appendix C, for specific sites. These measures of photographing, collecting, and test pitting are estimated to require 1 week's time for a three-member crew. An additional week is estimated by UNLV to catalogue, analyze the materials, and prepare a final report. The Center will continue to provide assistance during the construction of the facility.

Explosives may be used for the excavation of the 230-kV underground cable trench or for tower foundations on the radial distribution line between Parker Dam and the Havasu Pumping Plant. This area is adjacent to mobile home park areas, Arizona State Highway 95, and Heron Island which supports a rookery for the great blue heron. In addition to the standard provisions for the protection of persons and property, careful planning and controls will be exercised to minimize disturbance of the residents of the mobile home park and disruption of nesting activities of the great blue heron during the month of May. As necessary, blasting will be controlled to coincide with periods of least activity of the heron colony. Much more extensive blasting at the pumping plant site has already been experienced without observable adverse effects on wildlife.

Careful planning and designing of the power transmission system have contributed to the overall minimum adverse impact and reduction of extensive or extraordinary mitigation measures. There are no permanent residences on the planned right-of-way for the transmission line that require relocation.

A thorough knowledge of and adherence to Bureau of Reclamation standards for construction will reduce or eliminate the intensity of most of the adverse impacts experienced from construction activity.

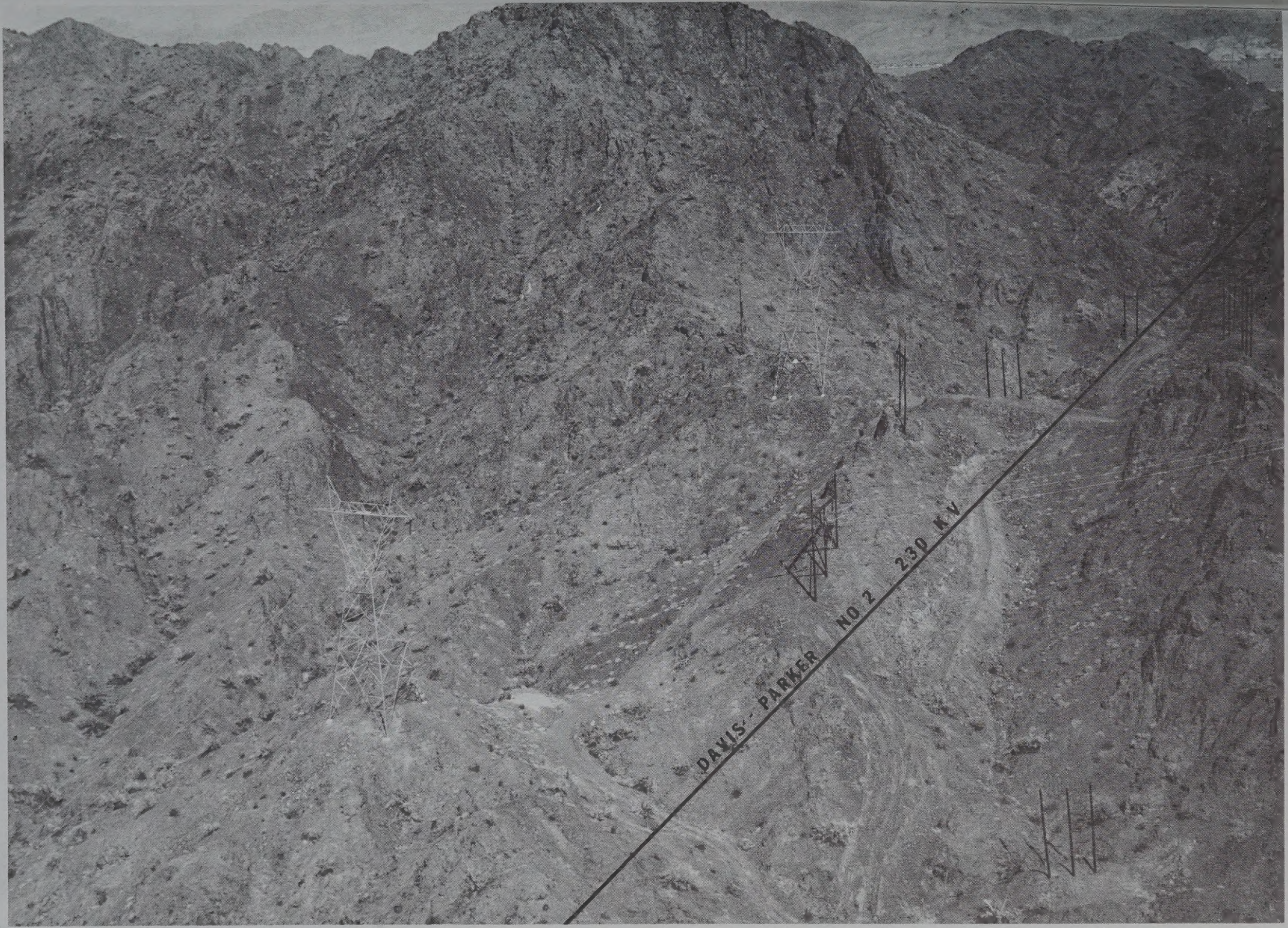


Figure 56. Whipple Mountains at Lake Crossing, California--Contrast of wood poles and steel towers with the surroundings--Davis-Parker 230-kV No. 2 Line--Transmission System, Granite Reef Aqueduct, Central Arizona Project--Photograph No. P344-300-01231NA.

CHAPTER V

UNAVOIDABLE ADVERSE IMPACTS

V. UNAVOIDABLE ADVERSE IMPACTS

It is apparent from the discussion in Chapter III, that there will be some undesirable effects from the transmission line system that cannot be avoided. Most of these impacts will be reduced in intensity by mitigation procedures outlined in Chapter IV.

The most obvious unavoidable impact is the contrast between manmade structures and the natural desert setting. This contrast is shown by the photograph on Figure 32. The visual effect will be most noticeable where the 115-kV radial feeder lines to the pumping plants will not parallel existing lines. During construction, there will be temporary visual impacts associated with the work near recreation and populated areas.

During seasons of high humidity, the interference to radio reception from corona energy in the immediate vicinity of the transmission line is unavoidable.

The temporary loss of vegetation from tower site preparation and storage and assembly areas is unavoidable, as well as the permanent loss of approximately 14 acres at tower foundations and by the clearing for the Harcuvar Substation and its attendant access road.

During construction, some crop loss will result within the area between the Liberty Substation and the Roosevelt Irrigation District canal because of tower sites. The amount and value of crops lost is unquantifiable as it will depend on the type of crops being grown at the time.

The right-of-way will occupy and restrict the future land use on approximately 4,200 acres. It will restrain the developer from constructing homesites on 24 acres of the Lake Havasu Travel Trailer Village that occupies approximately 640 acres between Lake Havasu City and Parker, Arizona. The photograph, Figure 22, taken in October 1973 while the development was being constructed, demonstrates the relationship the existing highway and development will have with the new transmission line.

Construction activity will have a temporary impact on wildlife. There will be a reduction in the Mohave and Sonoran Deserts habitat at the staging and equipment storage areas located at approximately 16-mile intervals, as well as tower sites. Affected areas will be allowed to return to natural conditions following the construction period. It is recognized that certain types of habitat, particularly involving large brush and cacti, will take several years to revegetate. The original biota associated with this type of habitat may be lost, however, after regrowth surrounding populations will expand and utilize these areas.

Some noise, dust, odors and smoke attendant to construction activity and the relevant movement of traffic on desert roads will be unavoidable.

The transport of heavy machines and equipment by truck, as well as the use of necessary safety precautions will cause occasional delays to the highway traveler.

New roads may open some desert areas for vandalism as well as for recreation. Birds perching on towers may become targets for individuals whose behavior reflects a lack of respect for the law.

CHAPTER VI

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

VI. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY 115

The construction and operation of the Granite Reef Aqueduct transmission system will result in both short- and long-term uses of the environment. For purposes of this environmental statement, environmental gains and losses which will be experienced throughout the life of the project will be included in the definition of short-term uses. Gains and losses whose influence will be felt beyond the project life are considered long-term consequences of the project.

Short-term environmental losses that are most immediately identifiable are those associated with the actual construction of the transmission line itself. Construction activities will require additional access routes to the transmission line corridor and land use in the corridor itself. Wildlife will be displaced by such activity and in limited areas agricultural activities will be occasionally disrupted. Some dust and noise will be associated with construction activities as well. An undetermined amount of structural steel will be committed to the construction of the system as will electrical conductor necessary for a 333-mile transmission system. In conjunction with utilization of these resources will be the short-term commitment of related material such as concrete, lumber, copper and petroleum products used in construction vehicles. The extent to which these resources will be used is unquantifiable at this time. Primary short-term use is the infusion of some $22 million of labor resources into the area for construction of the project. This short-term economic impact will largely be felt in existing metropolitan areas such as Las Vegas, Nevada and Phoenix, Arizona, but will probably have some effect on developing areas along the Colorado River. Other short-term uses directly associated with the construction and operation of the transmission line over the project life should be minimal although vegetative losses might be considered long term, depending on the success of revegetation programs. Wildlife will be able to return to uninhabited areas. Maintenance work should not be of such frequency as to permanently displace wildlife species reentering the area and human access to the area will not be materially increased because of the use of so much of the existing right-of-way. Esthetic losses will be kept to a minimum for this same reason.

The transmission system will provide power to the CAP pumps enabling the project to carry water from the Colorado River to central Arizona. In addition to this, construction of the transmission line will allow the replacement of the existing Parker-Phoenix 161-kV line, this will strengthen the interconnection between the Parker and Davis generating units and will thereby increase the reliability of the local Bureau of Reclamation transmission network. The existing transmission line would most likely be replaced by a transmission line very similar to the one proposed as part of the CAP. Because of this, it is not likely that the long-term use of the right-of-way for the proposed transmission line would be any different in the future as a result of this proposed construction, or that the future development of central and eastern Arizona would result in this right-of-way being used for any different purpose. The use of existing alinement for the new transmission line is also a long-term gain in the sense that a new corridor for this system would not be established.

Likewise, land use and land-use planning options will be minimally restricted but may be affected over both the short and long term. The Eldorado Valley in Nevada may be incrementally affected due to the addition of one more transmission line to the many existing lines that criss-cross this valley. Population and growth influences will also be small or perhaps negligible, due to the fact that the transmission line will not offer a new source of power to the area traversed but will have the power it carries committed to planned uses except in certain temporary situations. Power produced by the Navajo Generating Station for pumping, but not required during times of operating the aqueduct system at less than full load, will be added to the area power pool. The transmission system will have the capacity to deliver this power to points along the system although it is anticipated that such delivery would be to existing load centers. The amount of energy available to other users from Reclamation's entitlement to Navajo Project power will vary from year to year depending on the water supply available to the CAP. Based on a long-term average where 1.1 million acre-feet of water are supplied to CAP an estimated 1,804 gWh of energy will be available for sale to other utilities. It is not anticipated that new load centers would develop because of the intermittent and unscheduled nature of this excess supply.

The long-term effect of the project involves alternative uses of the right-of-way following the period of useful life of the project. Since most of the right-of-way is adjacent to existing transmission lines, it is most likely that the corridor will continue to be used either by rebuilding, replacing or upgrading the proposed line. Due to the relatively undeveloped nature of land use along the existing corridor, it is not probable that this project will stimulate other land-use changes. Other technologies and subsequent developments may make such lines obsolete, but may still utilize the established corridors. The alternative to retention or upgrading the lines would be abandonment or removal of the structures. There should be little long-term effect of the latter as the right-of-way should revert to land use typical of surrounding areas.

The Nevada Archeological Survey by photographing, collecting, and test pitting believes that it is possible to be able to relate the significance of the archeological sites to the aboriginal trails, settlement patterns, and utilization of the little known region paralleling the Colorado River. It is expected that archeologically this area may contain information that will help in clarifying the relationships of people occupying the Las Vegas Valley, Spring Mountain and other ranges closer to the Colorado River with the inhabitants of the mountains and river terraces to the south towards the Mohave Valley. The short-term effect of the project involves investigation of several sites discovered in the archeological surveys. This will commit this segment of the archeological resources of the area to study at this time. There should be little additional effect over the long term.

CHAPTER VII

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Some of the adverse impacts discussed in Chapter V are the result of or include a commitment of economic and natural resources. The extent to which it curtails the use of a resource for any other potential use is considered an irreversible or irretrievable commitment. For resources such as land surface, the commitment is an extension or reaffirmation of its present use.

Air space approximately 100 feet above ground elevation over the transmission line and the land area occupied by the tower footings and substation will be used throughout the life of the project. During the project life, restrictions will limit the type of land use within the right-of-way; however, most of the lines parallel existing lines where these restrictions presently exist.

Irretrievable will be vegetative loss at each tower site (20 square feet occupied by the four footings) and the clearing for the Harcuvar Substation (10 acres), its access road (1/2 acre), and the Havasu Pumping Plant cable spreading yard (1/2 acre).

Also committed will be 2,000,000 man-hours of employment and $45,975,000 in public and repayment funds.

Aggregates and cement that will become a part of the structures are not retrievable. In addition, 8,000 tons of steel for towers and 4,000 tons of aluminum for conductors are committed. The metals can be recycled at the end of their useful life. As a link between supply and demand, the system is committed to carry 24.3 percent of the net output of the Navajo Generating Station. This generating capacity was specifically constructed for the CAP aqueduct systems and would not otherwise be available in the power market area or for interim use when the pumps are operating at less than full capacity.

The estimated long-term average power requirement for operating pumping facilities for the Granite Reef Aqueduct is 1,675 gWh per year, based on a load requirement of 411 MW. Power for the facilities will be generated at the Navajo Generating Station which uses coal as its principal fuel. An average of 2,100 tons of coal per day will be required to service the facilities of the Granite Reef Aqueduct.

CHAPTER VIII

ALTERNATIVES TO THE PROPOSED ACTION

VIII. ALTERNATIVES TO THE PROPOSED ACTION

A. Introduction [1-3, 29]

This chapter will concern itself with other systems which were conceptually designed using various alternative transmission arrangements. In addition, this chapter will discuss alternative line routings of the proposed system and alternatives in the design of components of the proposed system. Alternate power sources, delivery points, and pumping plant locations and loads are not considered in this report because they have been covered in the following environmental statements which have been previously filed with CEQ:

	Title	No.	Date Filed
1.	Navajo Project	FES 72-1	February 4, 1972
2.	Central Arizona Project	FES 72-35	September 26, 1972
3.	Havasu Intake Channel, Havasu Pumping Plant, and Buckskin Mountains Tunnel	FES 73-2	January 15, 1973
4.	Granite Reef Aqueduct	FES 74-5	January 22, 1974

Although some of the alternatives discussed in this chapter seem desirable and feasible at the present time, it must be remembered that the entire transmission system will not be completed nor carry the CAP pumping power until approximately 1985 or later. Load growth, power system load flows, and system changes cannot be accurately predicted that far in the future. Therefore, the recommended proposed system will have to stand by itself in its ability to handle the CAP pumping load without depending on another utility's transmission system to handle part or all of the load. Those alternate plans which contain wheeling agreements or ties through other utilities and appear to be feasible at the present time will continue to be studied as each phase of the transmission system is constructed and may or may not be used depending on future changes to the existing power systems.

Consideration was given to uprating to a higher voltage the existing Parker-Davis Project's 230-kV transmission line from Mead Substation to the Parker Dam Substation. However, the existing lines were designed and constructed to utilize only one conductor per phase. Bundling the conductor would require rebuilding of the lines, including replacement of all towers with heavier construction and some respanning. Due to the power loading on these lines, they could not be taken out of service long enough to allow such rebuilding unless an alternate could be provided during the construction period. For this reason uprating and bundling the existing line was considered unfeasible.

Conceptual or theoretical alternatives to the transmission system, such as onsite steam generation, gas turbines, storage batteries or solar power have been generally excluded from consideration and are not considered as viable alternatives since the Bureau of Reclamation presently has a firm source of power from the Navajo Generating Station. Alternative sources of power were discussed in the Navajo Project Final Environmental Statement, FES 72-1, but were eliminated due to adverse environmental impacts, greater economic costs, scarcity of petroleum resources, and other constraints.

B. Transmission System Alternatives

The transmission system outlined in Chapter I was developed to serve the integrated needs of the Central Arizona Project, the Parker-Davis Project, and the Pacific Northwest-Pacific Southwest Intertie Project. Other systems were designed using various alternative transmission arrangements. These alternate plans as shown in Figure 57 include: (1) a single purpose system consisting of two parallel 230-kV transmission lines from McCullough Switching Station to the Westwing Substation without interconnecting any existing facilities; (2) tapping the Bureau of Reclamation's Mead-Liberty 345-kV line near Burro Creek and running a transmission line to the Parker area and on to Liberty Substation; and (3) starting a transmission line at the Southern California Edison Company's Mohave Generating Station and running it to Liberty Substation via the Davis and Parker Switchyards.

This section outlines the impacts associated with utilizing different systems to supply power to the Granite Reef Aqueduct pumping plants. Section VIII.C. considers alternate routes for transmission lines within the system described in Chapter I.

Table 7 shows a comparison of the miles of line, Colorado River crossings and numbers of new substations and switchyards for the three transmission systems alternatives.

1. Alternative No. 1

a. Description

A single-purpose plan to serve CAP only. An independent transmission system could be designed for CAP purposes only as shown in Figure 57 by the alinement labeled No. 1.

This alternative would require two parallel 230-kV transmission lines from the McCullough Switchyard to the Havasu Pumping Plant. The lines would then follow the canal to each of the other pumping plants and would terminate at Westwing Substation. A substation would be required in the immediate vicinity of each pumping plant. No estimate of the amount of new access roads is available. To the extent possible, existing access roads from other lines on the Granite Reef Aqueduct will be used to service the new lines. Adherence to established

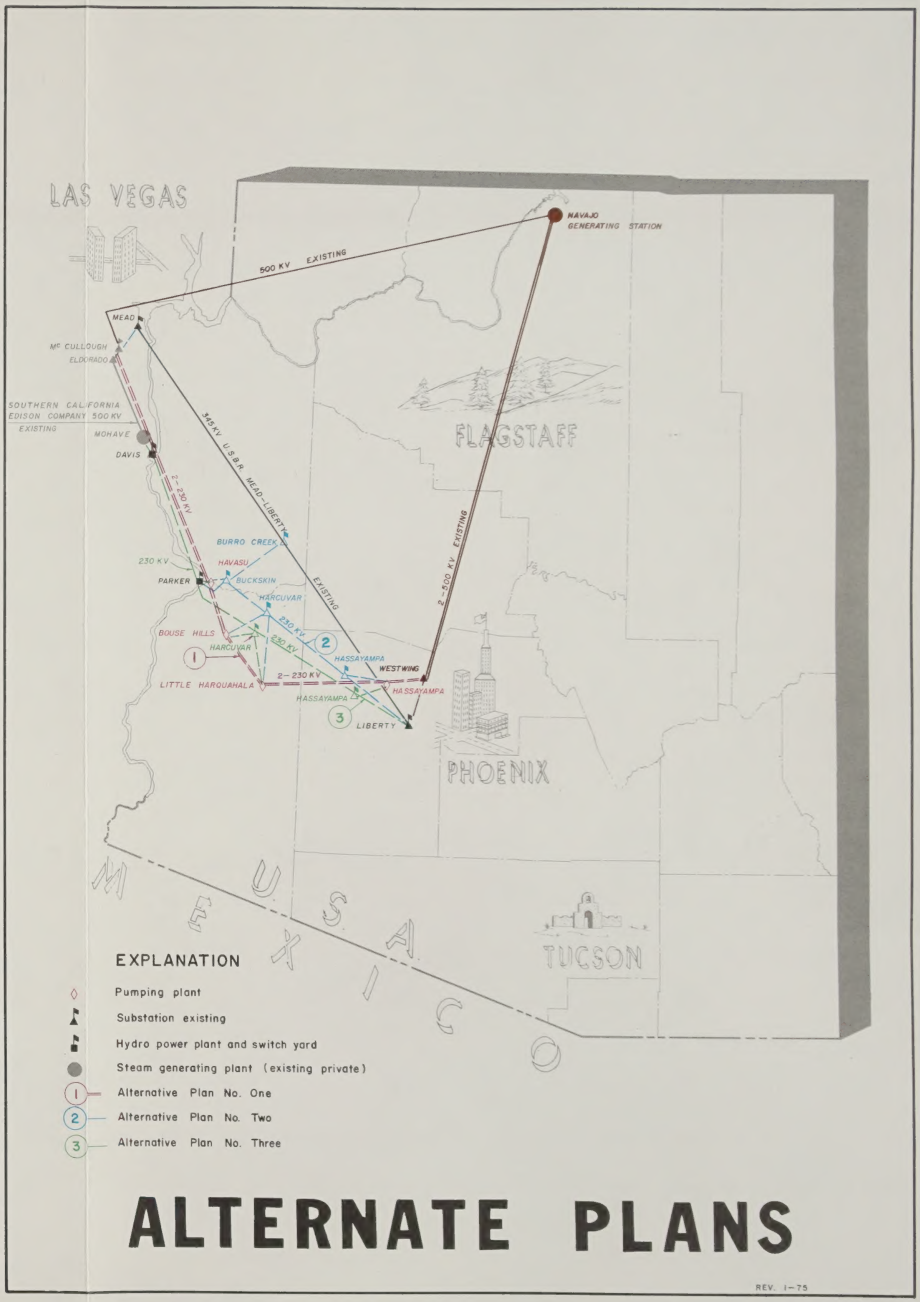

LAS VEGAS
NAVAJO GENERATING STATION
500 KV EXISTING
MEAD
Mc CULLOUGH
ELDORADO
SOUTHERN CALIFORNIA EDISON COMPANY 500 KV EXISTING
MOHAVE
DAVIS
2-230 KV
345 KV U.S.B.R. MEAD-LIBERTY EXISTING
2-500 KV EXISTING
FLAGSTAFF
BURRO CREEK
HAVASU
230 KV
PARKER
BUCKSKIN
HARCUVAR
230 KV
2
BOUSE HILLS
HARCUVAR
230 KV
1
HASSAYAMPA
WESTWING
2-230 KV
LITTLE HARQUAHALA
HASSAYAMPA
HASSAYAMPA
3
LIBERTY
PHOENIX
U.S.A.
MEXICO
TUCSON
EXPLANATION
Pumping plant
Substation existing
Hydro power plant and switch yard
Steam generating plant (existing private)
1 Alternative Plan No. One
2 Alternative Plan No. Two
3 Alternative Plan No. Three
ALTERNATE PLANS
REV. 1-75

Figure 57

TABLE 7
CENTRAL ARIZONA PROJECT
COMPARISON OF PROPOSED PLAN AND TRANSMISSION SYSTEM ALTERNATIVES

	Parallels Existing Lines (Miles)	Does Not Parallel Existing Lines (Miles)	Total (Miles)	New Substations and Switchyards	Colorado River Crossings
Proposed	264	70	334	1	3
Alternative 1*	210	340	550	4	1
Alternative 2	177	50	227	3	0
Alternative 3	182	70	252	1	3

*Total mileage for two parallel single-circuit transmission lines.

design criteria to maintain a sound and reliable system would, however, require duplication of almost all facilities because of the two lines requir to prevent degradation of the systems of neighboring utilities during contingency situations. This alternate plan would require the construction of 550 miles of transmission line versus 333.6 miles of transmission line described in Chapter I. For these reasons, and also to minimize the environmental impact of the CAP transmission additions, this alternative was dismissed as infeasible.

b. Description of the Environment

The routing of the single-purpose transmission system would be similar to the plan presented in Chapter I from the McCullough Switching Station to the Parker Substation. The line would travel south from McCullough Switching Station and would not pass through the Mead Substation. McCullough-Davis-Parker line is indicated on Figures 58 and 59. The routing from the Parker Substation would parallel and be immediately adjacent to the Granite Reef Aqueduct. A more accurate description of this environment may be obtained in the Granite Reef Aqueduct Final Environmental Statement, No. FES 74-5, dated January 22, 1974; however, it is considered that the descriptions in Chapter II to all intents and purposes are sufficient because of the close proximity to the aqueduct.

(1) Climate and Air Quality

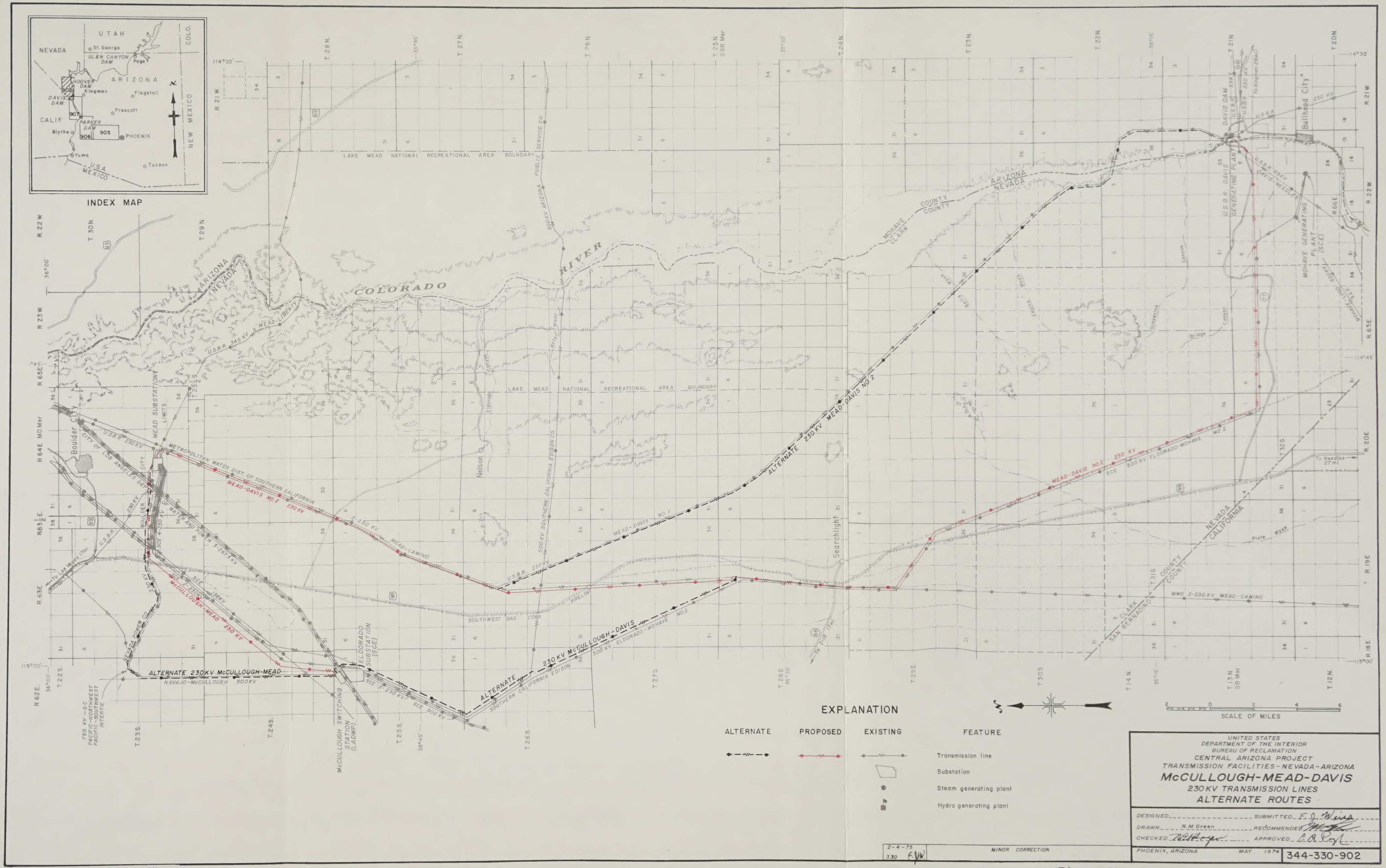
The climate of the area in which the single-purpose transmission system would be constructed is similar to the proposed system described in Section II.B. A summary of the climate described in Section II.B. is furnished for ready reference. The climate is typical of the arid Southwestern United States. It is characterized by long, hot summers; short, mild winters; sparse rainfall; low relative humidity; and high evaporative rates. The temperature averages about 70°F annually. Temperature extremes of 10°F in the winter and 120°F in the summer have been recorded. Sunshine occurs about 85 percent of the daylight hours. Hourly temperatures along the alinement will vary a few degrees depending on elevations that range from approximately 400 to 4,000 feet.

The mean annual precipitation is approximately 5 inches along the Colorado River and about 10 inches in the higher elevations. Flash flooding is typical at various locations along the line.

Winds of high velocity, dust devils, haboobs, and whirlwinds occur frequently throughout the year and carry considerable sand and dust.

(2) Vegetation

The vegetation of the area in which the single-purpose transmission system would be constructed is similar to the proposed



EXPLANATION

ALTERNATE	PROPOSED	EXISTING	FEATURE
◆—w—◆	●—w—●	●—w—●	Transmission line
		▱	Substation
		●	Steam generating plant
		▪	Hydro generating plant

2-4-75 330 F.J.W.	MINOR CORRECTION

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES-NEVADA-ARIZONA

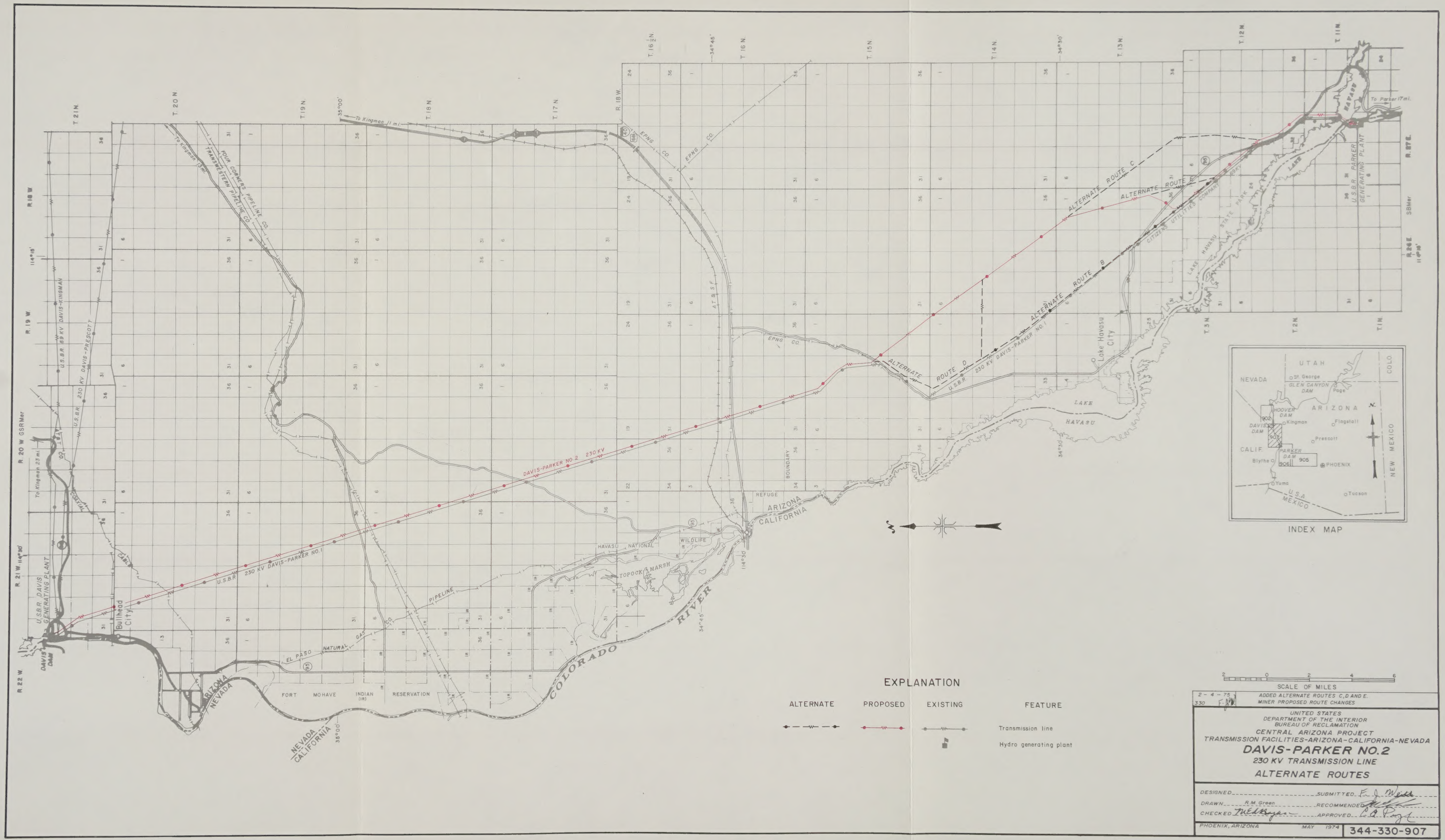
McCULLOUGH-MEAD-DAVIS
230 KV TRANSMISSION LINES
ALTERNATE ROUTES

DESIGNED
DRAWN R.M. Green
CHECKED
SUBMITTED F. J. Weiss
RECOMMENDED
APPROVED C. A. Pugh

PHOENIX, ARIZONA MAY 1974
344-330-902

Interior - Reclamation, B.C., Nev. 3-75

Figure 58



ADDED ALTERNATE ROUTES C, D AND E.
MINER PROPOSED ROUTE CHANGES
2-4-75
330 F. J. W.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES-ARIZONA-CALIFORNIA-NEVADA
DAVIS-PARKER NO. 2
230 KV TRANSMISSION LINE
ALTERNATE ROUTES

DESIGNED
SUBMITTED F. J. Weiss
DRAWN R.M. Green
RECOMMENDED
CHECKED M.E. Bryan
APPROVED C.A. Pugh
PHOENIX, ARIZONA MAY 1974
344-330-907

Figure 59

ystem described in Section II.D. A summary of the vegetation is ncluded here for ready reference.

The transmission system would traverse two distinctly ifferent Southwestern deserts with differing vegetal communities. orth of the Bill Williams River the system would cross the southwestern art of the Mohave Desert where the vegetation is predominantly shrubby. outh of the Bill Williams River the system would enter the Sonoran Desert here the vegetation is characterized by larger trees and shrubs, due primarily to a larger amount of rainfall.

Typical Mohave Desert vegetation consists mainly of creosote bush/bur-sage, Mohave yuccas, various species of cacti, catclaw, Joshua trees, ephedra, paloverde trees, mesquite trees, and smoke trees. Some types of grasses and wildflowers may also be found.

Typical Sonoran Desert vegetation consists mainly of paloverde, ironwood, smoke tree, mesquite tree, brittlebush, creosote bush/bursage, ocotillo, saguaro cactus, barrel cactus, cholla cactus and scattered grasses and wildflowers. Also found are the differentiated riverine and desert wash riparian vegetation such as mesquite trees, tules, cattail, saltcedar, willow, cottonwood, and paloverde trees.

(3) Wildlife

The wildlife of the area in which the three alternative routes of the transmission system would be constructed is similar to that of the proposed system described in Section II.E. For ease of reference a summary of the wildlife is shown below.

(a) Invertebrates

Common invertebrates of the area are scorpions, earwigs, ticks, flies, bees, wasps, termites, ants, butterflies, moths, crickets, beetles, mosquitoes, and spiders. Species common to water habitats may be found in and around the Colorado and Bill Williams Rivers, catchments, stock tanks, and ponds.

(b) Fish

Fish species present in the Colorado River include largemouth bass, bluegill, black crappie, channel catfish, striped bass, and rainbow trout. Because no impacts on fish are foreseen, a listing of fish species was not included in the appended material.

(c) Amphibians and Reptiles

Table 1, Appendix C, lists 45 species of amphibians and reptiles that inhabit the area of the proposed transmission system.

The most noticeable types of amphibians and reptiles include toads, lizards, and snakes.

(d) Birds

It is assumed that most of the birds listed in Table 2, Appendix C, are present in the areas of the alternatives since the habitat is very similar to that of the proposed transmission system. There are over 270 species that use the various habitat types in varying degrees. The waterfowl and shore birds listed are primarily confined to an area close to the Colorado River.

(e) Mammals

It is assumed that most of the mammals listed in Table 3, Appendix C, are present in the areas of the alternatives since the vegetation and terrain are very similar to that of the proposed transmission system. Wild mammals listed in the Appendix include 16 bats, 21 rodents, 2 rabbits, 9 carnivores, 2 omnivores, and 4 large herbivores.

(f) Threatened Species 72, 73,

There are seven species of wildlife whose ranges are included in the areas in question and which have been given special status in the Fish and Wildlife Service's 1973 edition of Threatened Wildlife of the United States. These species are the Gila monster (SU), southern bald eagle (E), prairie falcon (T), peregrine falcon (E), Yuma clapper rail (E), the osprey (SU), and the spotted bat (T).

(4) Archeology 75-80, 115, 131

The Bureau of Reclamation obtained an archeological inventory of the proposed transmission system route location through the National Park Service. The survey in July 1973 of the Mead-Davis-Parker portion of the transmission system was contracted to the Southern Branch, Nevada Archeological Survey, University of Nevada, Las Vegas, Nevada. An archeological survey was conducted by the Arizona State Museum along the area to be affected by the Granite Reef Aqueduct in June 1972. The results of this study are described in Section II.I. of the Granite Reef Aqueduct Final Environmental Statement, FES 74-5, Central Arizona Project. This survey would for the most part cover the area to be used by this alternate transmission line but additional study might be required.

(5) Historical 80, 138

There are no historical sites as listed in the National Register of Historic Places March 11, 1975, that would be affected by construction of this transmission system.

(6) Recreation 135, 136

Recreational use of the desert and urban-desert areas hrough which the transmission system will cross is mostly limited to orseback riding, off-road vehicle use, rock and gem hunting enthusiasts, nd hunting for desert mule deer, varmints, small game and birds. Fishing, oating and water skiing to some extent exists where the transmission line ould cross the Colorado River below Davis Dam.

(7) Noise

The most common sources of noise resulting from man's activities in areas where the single-purpose transmission system may be constructed are railroads, traffic over existing highways, airplanes, and off-road vehicles. Corona creates some sound effects that are inherent with overhead transmission of power at high voltages, and this is sometimes noticeable from existing lines in the area. This sound level is affected by weather conditions due to the air density and is more noticeable during periods of high humidity.

c. Environmental Impacts

Since the transmission system proposed in Chapter I contains several of the basic features included in Alternatives 1, 2 and 3, many of the environmental impacts of the alternatives will be the same as those described in Chapter III. Other impacts are distinctly individual by plan and will be discussed as they compare with impacts of the proposed plan, and the specific environments of the alternate contained herein.

This alternate would require the largest number of new transmission lines, structures, and substations and consequently would have the greatest environmental impact. A major new switchyard would be required in the vicinity of each pumping plant to terminate the 230-kV transmission lines. Impacts of each of the transmission lines would be similar to the impacts described in Chapter III, except that their magnitude would be much greater due to the duplication of facilities, and the fact that there are no other transmission lines in the area that would be traversed.

Specific environmental impacts are:

(1) Climate and Air Quality

The climate of the area in which the single-purpose transmission line would be located would not be affected. Air pollution from dust, smoke, and odors associated with the operation of the construction equipment would exist mostly in the area of direct activity. Workmen commuting between the worksite and their residences on unsurfaced access or County roads will add to the dust load because of the increased traffic volume. Heavy equipment-laden trucks delivering materials to the staging area will also contribute to dust pollution. Construction of new access roads and excavation for structure foundations where the surface is disturbed will be one of the contributing factors due to winds, whirlwinds, haboobs and dust devils.

The contractor would be required to sprinkle disturbed areas to prevent excessive dust.

(2) Vegetation

During the construction period, local disturbance of vegetation is anticipated. Vegetative clearings of storage sites, access roads, tower sites, substations, and spur roads will be required.

Tower site clearing may not be necessary except for the foundation footings that will result in a permanent loss of vegetation. If the towers are erected by crane, vegetation outside the foundation area would be disturbed by the equipment even though the area would not be cleared. For the most part vegetation is sparse small shrubs; however, larger vegetation exists at the higher altitudes and some larger vegetation such as Joshua trees, ironwood, and paloverde may have to be removed. Precautions to minimize loss of vegetation would be included in construction specifications.

Abandoned access roads and staging sites would be rehabilitated after construction so that vegetation would naturally reclaim the areas.

(3) Wildlife

Just as the wildlife that inhabits the area of the alternative systems is similar to that of the proposed system, the impacts on that wildlife are expected to be similar. The expected impacts on wildlife due to the proposed system are discussed in Chapter III.

(4) Archeology

The environmental impacts on the archeology of the single-purpose transmission system would be identical to the impacts of the proposed system described in Chapter III. Onsite archeological surveys along this proposed alinement have not been made. In the event this alternate was selected, an archeological survey would be performed and steps taken during construction to assure that no significant archeological values would be lost. The site would be flagged by an inspector, and proper authorities notified of its existence. Since the surveys and studies on the proposed route did not indicate significant or major values, it is expected that the impacts of the single-purpose transmission system would be the same as those in Chapter III.

(5) Historical [80, 138, 141]

Since there are no recorded historical sites affected by the routing of this line, no adverse impacts are expected.

(6) Recreation

Little change in recreation would be realized as a result of constructing the single-purpose transmission system. Temporary interruptions may be experienced by off-road vehicle users traveling the access roads.

(7) Noise

Construction noise caused by construction equipment would be experienced by man mainly in the Davis Dam, Havasu City, and Havasu Pumping Plant areas. Construction noise would have a temporary impact on the wildlife in the immediate areas of activity.

2. Alternative No. 2

a. Description

In lieu of constructing the Mead-Davis 230-kV No. 2 and Davis-Parker 230-kV No. 2 transmission lines, consideration is being given to tapping the Bureau of Reclamation Mead-Liberty 345-kV transmission line to serve the Granite Reef Aqueduct pumping plants. This line would parallel an existing 69-kV transmission line from a substation that would be constructed in the Parker area, called Buckskin Substation, to a future substation called Burro Creek Substation near Bagdad, Arizona. This proposed alternate is shown as alinement 2 on Figure 57.

This alternative would require a 345-kV or 345/230-kV Burro Creek Substation to be located south of Wikieup, Arizona, and west of Bagdad to take power from the existing 345-kV transmission line. A 45-mile transmission line would tie this substation to the Buckskin Substation. A new access road and right-of-way would be required, or the existing access road used for the existing Parker-Bagdad 69-kV line would have to be enlarged for construction along the transmission line.

The Parker-Harcuvar-Liberty 230-kV line would still be required to provide service to the pumping plants along the Granite Reef Aqueduct and to back up the 345-kV tap on the Mead-Liberty line. Also, the McCullough-Mead 230-kV line would still be required to deliver power from the McCullough Switching Station to Mead Substation, a terminal for the Mead-Liberty 345-kV line.

The necessary transmission line to tap the Mead-Liberty line would have to traverse extremely rugged country and pass through an area presently occupied by only a small wood-pole line. Use of this system would require reserving 250 MW of capacity in the Mead-Liberty 345-kV line and preempting the use of this capacity from the Pacific Northwest-Pacific Southwest Intertie. In addition, the use of this line would be complicated by the addition of a phase shifter at Liberty Substatio which will have to be installed by the Navajo Project participants to eliminate problems of circulating power flow caused by power schedules over the Mead-Liberty 345-kV line.

b. Description of the Environment [102]

This alternate alinement involves a 230-kV or 345-kV line connecting to the 345-kV Mead-Liberty transmission line in the vicinity of Bagdad, Arizona, and routed to Parker Dam, California. The alinement of the Parker-Liberty line is identical to that described in Chapter I and so the description of the environment described here will only concern itself with the Bagdad-Parker segment of the alternate.

(1) Climate and Air Quality

The climate of the area that the transmission line would traverse, from Wikieup, Arizona, south to the Buckskin Substation that would be located near the Havasu Pumping Plant, is typical of the arid Southwestern United States. It is characterized by long, hot summers; mild winters; sparse rainfall; low relative humidity; and high evaporative rates. Temperature extremes of 10°F. in the winter and 120°F. in the summer have been recorded. Sunshine occurs about 85 percent of the daylight hours. Temperatures along the route will vary a few degrees depending on elevation that ranges from approximately 3,000 feet to 600 feet.

The mean annual precipitation is approximately 5 inches along the Colorado River and about 10 inches at the higher elevations. Flash flooding is typical at various locations along the line.

Winds of high velocity, dust devils, haboobs and whirlwinds occur frequently throughout the year and carry considerable sand and dust. There is little dust pollution caused by vehicle travel over the access road as it is seldom used.

(2) Vegetation

The transmission line would traverse lands within the Mohave and Sonoran Deserts since the Bill Williams River is considered to be the transitional zone. Vegetation common to both deserts exists depending upon elevations and other conditions. Small brush and cacti are the common vegetation in the lower elevations near the Havasu Pumping Plant. Riverine riparian vegetation is also encountered at or near the Bill Williams River and the Big Sandy.

Typical Mohave Desert vegetation consists mainly of reosote bush/bur-sage, Mohave yuccas, various species of cacti, catclaw, oshua trees, ephedra, paloverde trees, and smoke trees. Some types of rasses and wildflowers are also present.

Typical Sonoran Desert vegetation consists mainly of aloverde, mesquite, ironwood, smoke tree, brittlebush, creosote bush, ur-sage, and ocotillo, saguaro, barrel, and cholla cacti. Scattered rasses and wildflowers are also present.

(3) Wildlife

The wildlife that inhabits the area to be traversed by lternative No. 2 is virtually the same as that of Alternative No. 1. t would be redundant to repeat the description given under Alternative o. 1. Lists of amphibians and reptiles, birds, and mammals are given in ppendix C.

(4) Archeology

An archeological survey has not been conducted on the Bagdad-Parker reach. In the event further consideration is given to selection of this system, a survey will be made and clearance obtained prior to construction. At the present time there are no known archeological sites along this alternative route. The route selected would be parallel and immediately adjacent to the existing Parker-Bagdad 69-kV transmission line.

(5) Historical [80, 108, 138, 141]

There are no historical sites, as listed in the National Register of Historic Places dated March 11, 1975, that would be affected by construction of this transmission system.

(6) Recreation [136]

Recreational use of the desert area through which the transmission system will cross is largely limited to horseback riding, off-road vehicle use, rock and gem hunting and hunting for small game, varmints, and birds. Some big game hunting for desert mule deer, javelina, and big horn sheep may also be experienced.

(7) Noise

Most of the noise along the proposed route exists on both ends where highways are located and the area is inhabited by man. Some noise by maintenance crews on the 69-kV transmission line is experienced occasionally. Airplanes also create noise and can be heard throughout the system. Some noise is created by corona from the existing 69-kV transmission line, especially during periods of high humidity.

c. Environmental Impacts

The 45-mile transmission line connecting the Burro Creek Substation with the Buckskin Substation would have a greater degree of esthetic contrast impact than the proposed McCullough-Mead-Davis-Parker route because the line would traverse rugged country and pass through an area presently occupied by only a small wood-pole line. The line routing would pass through about 0.25 mile of the Havasu National Wildlife Refuge in the lower Bill Williams River area paralleling the existing Parker-Bagdad 69-kV transmission line.

Specific environmental impacts are:

(1) Climate and Air Quality

The climate of the area in which this transmission line would be located would not be affected.

Air pollution from dust, smoke, and odors associated with the operation of construction equipment would exist mostly in the areas of direct activity. Dust would be present from natural and disturbed areas caused by winds, dust devils, haboobs, and whirlwinds. Workmen commuting between the worksite and their residences on unsurfaced access or County roads will add to the dust load because of the increased traffic. Heavy- equipment-laden trucks delivering materials to the staging areas would also contribute to dust pollution. Construction of new access roads or enlargement of the existing access road and excavation for structure foundations where the surface has been disturbed would be the major contributing factor.

The contractor would be required to sprinkle disturbed areas during construction to prevent excessive dust.

(2) Vegetation

During the construction period, local disturbance of vegetation, clearing of storage sites, access roads, tower sites, substations, and spur roads will be required. Tower site clearing may not be necessary except for the foundation footings that would result in a permanent loss to vegetation. If the towers are erected by crane, vegetation would be disturbed by the equipment even though the tower foundation area would not be cleared. For the most part, vegetation is sparse and common to small brush. However, larger vegetation exists at the higher altitudes and some larger vegetation, such as Joshua trees, ironwood, and paloverde, may have to be removed. Precautions to minimize loss of vegetation would be included in construction specifications.

Abandoned access roads and staging sites would be rehabilitated after construction so that vegetation would naturally reclaim the areas.

(3) Wildlife

Just as the wildlife that inhabits the area of the alternative systems is similar to that of the proposed system, the impacts on that wildlife are expected to be similar. The expected impacts on wildlife due to the proposed system are discussed in Chapter III.

(4) Archeology

An archeological survey of the proposed alinement of the transmission line would be conducted prior to any construction. Findings will be evaluated by a competent professional who will make a determination in consultation with the State Historic Preservation Officer regarding the property's eligibility for inclusion on the National Register of Historic Places. It is expected that the archeological impact would be negligible.

(5) Historical 80, 108, 138, 141

There are no known registered historical sites affected by the routing of this line.

(6) Recreation

Recreation in the area would probably increase slightly due to better access roads making it easier to travel. The hunting impact would be negligible due to the sparseness of game.

(7) Noise

Noise would be noticeable during construction in the area. Some wildlife would be disturbed along the transmission line. A few Yuma clapper rail may be adversely affected in the event the routing of the line is in the immediate vicinity of their habitation in the Bill Williams delta area.

3. Alternative No. 3

a. Description

In lieu of constructing the Mead-Davis 230-kV No. 2 and the Mead-McCullough transmission lines, consideration is being given to constructing a short tieline, approximately 4 or 5 miles in length, from the Davis Switchyard tying into the Southern California Edison Company's (SCE) Mohave Generating Station Switchyard which in turn is connected to the McCullough Switching Station by means of a 500-kV line from Mohave to Eldorado to McCullough. This alternative would require wheeling of CAP power and energy over the existing SCE Eldorado-Mohave 500-kV line. The additions from Davis to Parker to Liberty would be the same as in the system proposed in Chapter I and no new access roads would be required. This alternate is shown by alinement 3 on Figure 57.

A short access road approximately 4 or 5 miles in length and a right-of-way would be required from the SCE Mohave Generating Station located in Nevada to the Davis Switchyard located upstream in Arizona. This system is believed to be technically feasible and is still under study at this time.

b. Description of the Environment

For the most part Alternative No. 3 is geared to a wheeling agreement with SCE from the McCullough Switchyard to the Mohave Generating Station over an existing 500-kV transmission line. Accordingly, the environment described below will be for the interconnection between the Mohave Generating Station and the Davis Switchyard as the description of the environment for the rest of the system is described in Chapter II.

(1) Climate and Air Quality

The climate in the area where the short interconnection would be located is hot in the summer and mild in the winter. Extreme temperatures range from 15°F. to 120°F. and the elevation is less than 1,000 feet. It is characterized by long, dry, hot summers with less than 5 inches of rainfall per year.

Winds of high velocity occur frequently throughout the year and carry considerable dust and sand. At the present time, stack emissions from the Mohave Generating Station contribute to the clean air problem which is being experienced in the area; however, this is expected to improve when the SO_2 scrubber system is installed and in operation. Boat and car exhausts also contribute to the problem.

(2) Vegetation

This short reach of transmission line would be constructed through the Mohave Desert. Vegetation in the area where the transmission line would be located is very sparse and consists of small cacti and creosote bush/bur-sage. Immediately adjacent to the Colorado River, mesquite trees, arrowweed, catclaw, saltcedar, and willows are predominant.

(3) Wildlife

The wildlife that inhabits the area to be traversed by Alternative No. 3 is virtually the same as that of Alternative No. 1. It would be redundant to repeat the description given under Alternative

No. 1. Lists of amphibians and reptiles, birds, and mammals are given in Appendix C.

(4) Archeology

An archeological survey for this short reach of transmission line has not been conducted. In the event further consideration is given to selection of this system, a survey would be made and clearance obtained prior to construction. At the present time there are no known archeological sites along the route.

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(5) Historical

There are no known historical sites as listed in the National Register of Historic Places dated March 11, 1975, that would be affected by construction of this transmission system.

(6) Recreation

Recreational use of the desert area through which the transmission system will cross is largely limited to horseback riding, off-road vehicle use, rock and gem hunting and hunting. Water skiing and motorboating are found on the Colorado River and Lake Mohave.

(7) Noise

Most of the noise along the proposed route emanates from the existing highway, Colorado River, Mohave Generating Station, Bullhead City, and other areas inhabited by man. Airplanes can be heard throughout the system at various times.

c. Environmental Impact

This alternative plan has the environmental impacts of the selected plan in all areas except in Nevada where a short 230-kV transmission line 4 or 5 miles in length would be constructed from the Mohave Generating Station to the Davis Switchyard in lieu of the McCullough-Mead-Davis 230-kV line.

Specific environmental impacts are:

(1) Climate and Air Quality

The climate of the area in which this 230-kV transmission line would be located would not be affected.

Air pollution from dust, smoke, and odors associated with the operation of construction equipment would exist mostly in the areas of direct activity. Dust would be present from disturbed areas caused by winds, dust devils, and whirlwinds. Workmen commuting between the work-site and their residences on unsurfaced access roads would add to the dust load because of the increased traffic volume. Heavy-equipment-laden trucks delivering materials to the staging areas would also contribute to dust pollution. Construction of new access roads and excavation for structure foundation where the surface has been disturbed would be the major contributing factor.

The contractor would be required to sprinkle disturbed areas during construction to prevent excessive dust.

(2) Vegetation

During the construction period, local disturbance of vegetation is anticipated. Vegetation clearing of storage sites, access roads, and spur roads will be required. Tower site clearings may not be necessary except for the foundation footings that would result in a permanent loss to vegetation. If the towers are erected by crane, vegetation would be disturbed by the equipment even though the area would not be cleared.

Precautions to minimize loss of vegetation would be included in construction specifications.

No riverine riparian vegetation at the Colorado River crossing would be disturbed.

(3) Wildlife

Just as the wildlife that inhabits the area of the alternative systems is similar to that of the proposed system, the impacts on that wildlife are expected to be similar. The expected impacts on wildlife due to the proposed system are discussed in Chapter III.

(4) Archeology

An archeological survey of the proposed alinement of the transmission line would be conducted prior to any construction. Findings will be evaluated by a competent professional who will make a determination in consultation with the State Historic Preservation Officer regarding the property's eligibility for inclusion on the National Register of Historic Places. It is expected that the archeological impact would be negligible.

(5) Historical

Since there are no registered historical sites affected by the routing of this line, no impacts are anticipated.

(6) Recreation

Recreation in the area would probably increase slightly due to another access road that would be used by motorcyclists and other trail travelers. The hunting impact would be negligible due to the sparseness of game.

(7) Noise

Noise would be noticeable during the short period of construction in the area. Some wildlife would be disturbed along the transmission line.

C. Routing and Location Alternatives within the Proposed Plan

1. Transmission Lines

Within the adopted concept of interconnecting with the existing Federal transmission system, there are alternatives of design, most of which result from differences in routing and substation requirements. These alternate routes traverse land similar to the plan presented in Chapter I. Consequently, description of the environment and impacts on the environment are similar to those outlined in Chapters II and III except that the overall magnitude of impacts will vary depending on changes in lengths of transmission lines proposed. The following discussions list the possible alternate routes and any impacts that may be peculiar to them. Table 8 shows a comparison of landownership, by miles, that the various alternate routes will cross.

a. McCullough-Mead 230-kV Transmission Line

Although the increasing power demand of the Southwest may require the construction of the 230-kV McCullough-Mead connection as proposed, a temporary alternative 230-kV connection is to make a contractual agreement with one of the owners and operators for an existing line. It is readily discerned from the discussion in Chapter III that the construction of the McCullough-Mead segment has little if any adverse ecological impact on the area. The Nevada Division of the Colorado River Resources believes that a McCullough-Mead connection would be best located around those lands designated for acquisition under Public Law 85-339, as amended.

As described in Chapter II, the proposed McCullough-Mead line will cross certain land in Eldorado Valley that has been set aside under Public Law 85-339, as amended, for use by the State of Nevada subject to submittal of a satisfactory plan of development to the United States Government. It is conceivable then that at some time, possibly in the near future, the proposed transmission line would have to be rerouted to accommodate possible development. Hence, consideration is

TABLE 8
COMPARISON OF LANDOWNERSHIP FOR ALTERNATE ROUTES OF TRANSMISSION LINES

Route	Federal	Recreation	State	Private	Total Miles
Liberty-Parker 230-kV Segment					
Proposed	8.75	0	1.75	8.75	19.25
Route A	13.75	0	4.75	2.75	21.25
Route B	13.25	0	0	4.75	18.00
Route C	13.25	0	0	5.50	18.75
Route D	13.25	0	0.75	5.00	19.00
Route E	10.00	0	0.50	7.75	18.25
Harcuvar-Little Harquahala 115-kV					
Proposed	24.60	0	2.20	0	26.80
Alternate	25.0	0	1.00	2.75	28.75
Relocate Harcuvar Substation	30.5	0	5.0	0	35.50
Harcuvar-Bouse Hills 115-kV					
Proposed	16.9	0	4.0	1.70	22.60
Double-circuited to Liberty-Parker 230-kV	22.25	0	3.8	1.70	22.75
Relocate Harcuvar Substation	8.0	0	0	0	8.00
McCullough-Mead 230-kV					
Proposed	4.8	0	10.5	0	15.3
Avoid lands set aside under P.L. 85-339	15.0	0	3.75	0.5	19.25
Mead-Davis 230-kV					
Proposed	54.0	2.0	11.3	1.0	68.30
Parallel existing Mead-Davis No. 1 230-kV	27.7	22.25	10.75	0	60.70
McCullough-Davis 230-kV	50.0	2.0	8.5	1.0	61.50
Davis-Parker 230-kV					
Proposed	46.5	4.0	6.5	14.0	71.0
Alternate "A"	47.0	4.0	3.25	13.25	67.5
Alternate "B"	43.0	4.0	3.00	20.00	70.0
Avoid Aubrey Hills Scenic Area (BLM Proposal)	48.5	3.5	5.00	14.5	71.5

being given to routing the line originally to avoid crossing this set-aside land and thus avoiding possible conflicts in the future.

This route would run north from the McCullough Switching Station paralleling the Navajo-McCullough 500-kV transmission line to the intersection of the proposed Oregon Border-Mead 750-kV d.c. transmission line. From this point it would run east paralleling the route of the proposed Oregon Border-Mead line to the Mead Substation. This route would be more expensive than the proposed plan due to the 4 miles additional length required.

b. McCullough-Davis 230-kV Transmission Line

A direct route between the McCullough Switching Station and the Davis Switchyard (Figure 58) would eliminate a terminal at the Mead Substation. Though this alternative has the economic advantages of eliminating the cost of additions to Mead Substation, future growth may create a demand for a new line between Mead Substation and Davis Switchyard. In order to uprate the total system, this bypass of Mead Substation is not included in the proposed plan.

This route would eliminate the interconnection to Mead Substation and would connect the McCullough Switching Station directly to the Davis Switchyard. The line would run south from the McCullough Switching Station parallel to the SCE Mohave-Eldorado 500-kV transmission line for approximately 24 miles where it would intersect the proposed Mead-Davis No. 2 line, see Figure 3, and continue on to Davis Dam. It would be the most economical route overall, but would not provide an interconnection with the Mead Substation which is desirable in the Regional interconnected transmission system.

As stated above, the feasibility of bypassing Mead Substation is still being investigated from a technical point of view. The proposed initial CAP water delivery date of January 1985 provides adequate time to continue investigations concerning this portion of the transmission system. System uprating was foreseen during the planning of Mead Substation and it was constructed to provide for expansion and interconnecting facilities.

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c. Mead-Davis No. 2, 230-kV Transmission Line

An alternative route for a portion of this segment of the system is shown on Figure 58. Access for construction is excellent because the route will parallel an existing 230-kV Bureau of Reclamation line. Due to adverse environmental impacts of crossing 24 miles of the Lake Mead National Recreation Area, the long Lake Mohave water crossing that would be required and the crossing of Katherine Landing, this alternative route is considered undesirable.

Rerouting the Mead-Davis segment to parallel an existing Bureau of Reclamation 230-kV line through the Lake Mead National Recreation Area will result in fewer construction and operating environmental impacts except for the adverse effect at the Lake Mohave and Katherine Landing crossings. The area is remote and the alternative alinement as shown on Figure 58 would have no visual effect. Routing along an existing corridor would be in accord with National policy.

d. Davis-Parker No. 2, 230-kV Transmission Line

This segment of the transmission system between the Davis and Parker Switchyards would parallel an existing 230-kV Bureau of Reclamation line except for the bypass east of the Lake Havasu City area (Figure 59). Alternate "D" was the original proposed route to serve Citizens Utilities Company's proposed Havasu City substation approximately 5.5 miles north of Lake Havasu City. This alternate route would interconnect with the Citizens Utilities Company's proposed substation in order to supply the growing needs of the Lake Havasu City area. Since filing the draft environmental statement,no firm substation site has been selected by Citizens Utilities Company and hence no arrangements have been made with Citizens Utilities Company for tapping either of the two transmission lines. Therefore the new proposed route of the transmission system has been changed to include Alternate "A" described in the draft statement.

Alternate "B" was to either parallel the existing line through Lake Havasu City or to remove the existing line and construct a double circuit line on its right-of-way through the city. Paralleling the existing line would require removal of existing homes on the required additional right-of-way. The existing line could not be taken out of service for the length of time required to remove it and build a double circuit line, and therefore, would require the construction of a shoo-fly line around Lake Havasu City during the construction period. The shoo-fly line would require temporary right-of-way and construction roads. Therefore, after considering the above problems Route "B" was found to be undesirable because of the costs and the human impacts associated with it.

The Bureau of Land Management proposed another alternate route that would keep the line east of State Highway 95 south of Lake Havasu City until it approaches the proposed Colorado River crossing into the Parker Switchyard. This routing would keep the line out of the proposed Aubrey Hills scenic area of the Havasu Planning Unit. This routing would incur considerable additional cost as the terrain to be crossed is much more rugged than the proposed alinement. A new access road for the line would open up a portion of a relatively unspoiled area. Negotiations with BLM to reach an optimum alinement in accord with National policy to reduce the proliferation of right-of-way corridors has resulted in the adopted routing discussed in Chapter I. As a result of these negotiations the alinement was changed to avoid the Standard Wash area to the east side of State Highway 95.

e. Liberty-Parker 230-kV Transmission Line

The portion of the system that links the Parker Switchyard and the Liberty Substation near Phoenix is approximately 121 miles long (Figures 60 and 61). It will replace a line about 137 miles in length that terminates at Phoenix Substation located near 43rd Avenue and Buckeye Road in southwest Phoenix. The new 230-kV transmission line will be constructed on the existing right-of-way until it reaches an area near the Hassayampa River, which is about 18 miles west of the terminal at Liberty Substation. From this point, new routing into Liberty Substation will be required.

Various routings were studied for this 18-mile-long segment. Final route selection was determined by a comparison of impacts of the alternative routings. As shown by Figure 61, Route A will pass too near the Caterpillar Tractor Company Proving Ground and two airplane landing fields; Route B will cross 3.5 miles of irrigated farmland and requires the acquisition of 7.5 miles of new right-of-way where it does not parallel existing lines and will also be near an airplane landing field; Route C will not parallel existing lines for 8 miles, requiring the acquisition of new rights-of-way, and crosses the Sonoran Heights Subdivision and the Phoenix Skyline West Subdivision; and Route D will cross various existing transmission lines requiring the use of single-circuit towers and additional right-of-way for these crossovers. Route E would parallel the existing Mead-Liberty 345-kV line to Liberty Substation. It would also cross the Sonoran Heights Subdivision and the Phoenix Skyline West Subdivision.

The alternative of tapping the new 230-kV Liberty-Parker line to feed the Bouse Hills, Little Harquahala, and Hassayampa was also considered as an alternative to constructing Harcuvar Substation and the 115-kV radial transmission lines. Making three 230-kV taps on the 230-kV Liberty-Parker line, one for each pumping plant, would be the least feasible from an economically, environmental and reliability standpoint. Economically the cost would be more than the proposed system. The three tap lines would lessen the reliability of the 230-kV system in that any outage on the 230-kV system would dump all three pumping plants whereas the proposed system provides an alternate 230-kV feed on loss of either portion of the Liberty-Harcuvar-Parker line. Environmentally this alternative would require approximately 300 more acres of right-of-way.

A combination of the proposed system and the 230-kV tap lines would probably be the most acceptable alternate. This would include a

230-kV tap line to Hassayampa Pumping Plant with the tap in the vicinity of the Hassayampa River where the proposed 115-kV line meets the 230-kV Liberty-Harcuvar-Parker line. The Bouse Hills and Little Harquahala Pumping Plants would be fed via 115-kV lines as in the proposed system. This system may slightly decrease the reliability, decrease the costs, and increase the right-of-way requirements by approximately 125 acres. These alternatives are continuing to be studied prior to making final designs.

f. Liberty-Hassayampa Pumping Plant 115-kV Radial Transmission Line

The proposed method as discussed in Chapter I of providing power to the Hassayampa Pumping Plant will require installation of a 115-kV radial transmission line from Liberty Substation. The location of the pumping plant makes it possible to parallel the 230-kV Parker-Liberty line for the 18-mile distance from Liberty Substation to the Hassayampa River. A separate single-circuit line paralleling the proposed alinement would add reliability to the system but would require additional right-of-way.

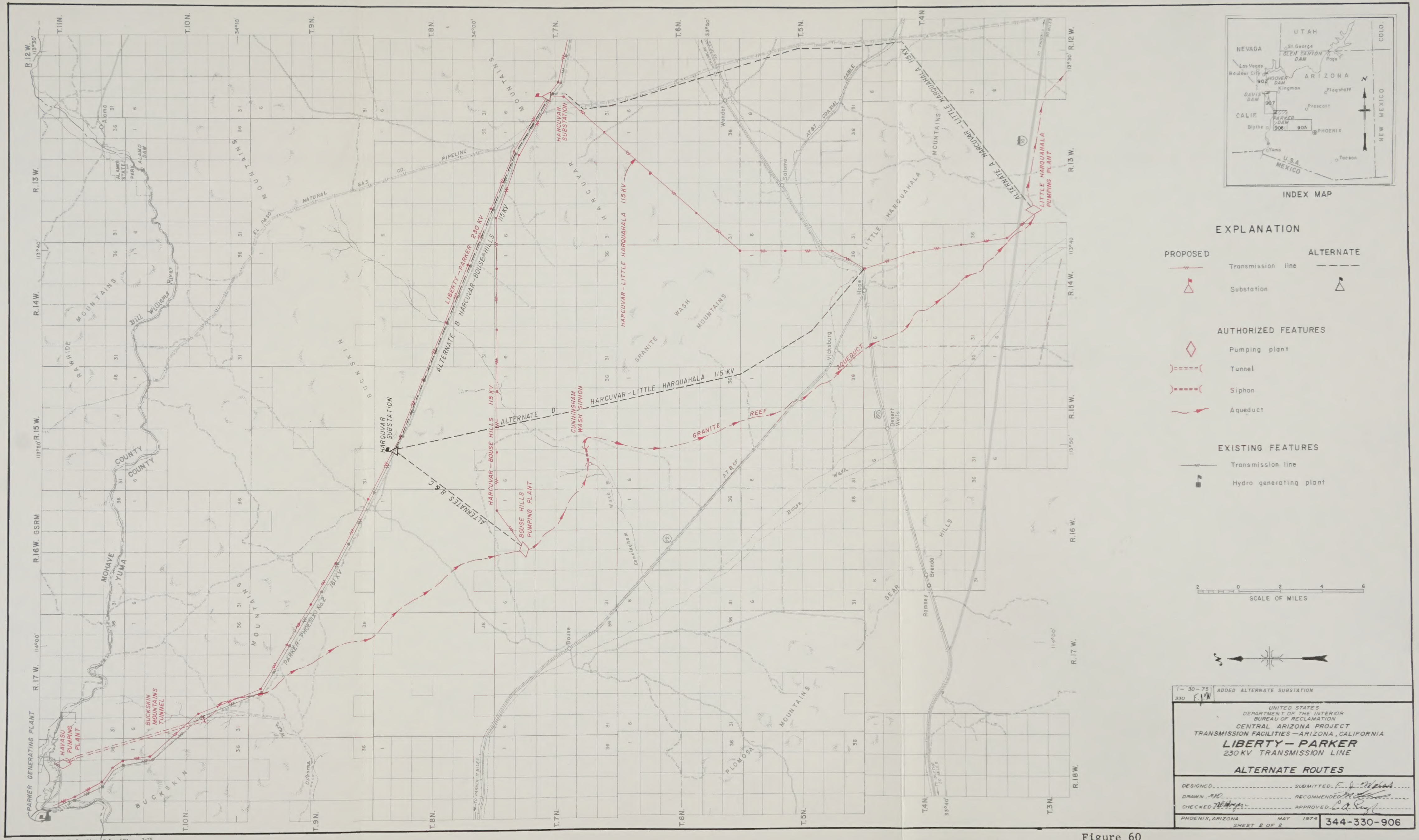
g. Harcuvar-Little Harquahala and Bouse Hills Pumping Plants 115-kV Radial Transmission Lines

There are many advantages to constructing a transmission line parallel to existing utility or other transmission line right-of-way, including the availability of existing maintenance roads for construction and use of an area that has an established land use and reducing the mileage of maintenance patroling. An alternate to the Harcuvar-Little Harquahala Pumping Plant route as described in Chapter I is 2 miles longer, but is considered because it is parallel to the underground pipeline operated by the El Paso Natural Gas Company. This 28 mile route runs south from the Harcuvar Substation as shown on Figure 60 for 18 miles where it turns southwest for about 10 miles to the Little Harquahala Pumping Plant, and,while the adverse impact of road construction is minimized, there will be added impacts of crossing areas of irrigated agricultural land near Centennial Wash.

An alternate for the Harcuvar-Bouse Hills 115-kV radial transmission line is to parallel the 230-kV proposed line for 16 miles on double-circuited towers and then run a 9-mile tangent to the Bouse Hills Pumping Plant. This alternate would shorten the amount of new ground crossed and reduce the overall number of towers. The line would be about 2-1/2 miles longer and more costly under this alternate.

h. Parker-Havasu Pumping Plant Radial Transmission Line

The choice of an underground cable system for six-tenths of a mile on the 230-kV line between Parker Dam Switchyard and Havasu Pumping



1-30-75 330 F.J.W. ADDED ALTERNATE SUBSTATION

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES—ARIZONA, CALIFORNIA
LIBERTY—PARKER
230 KV TRANSMISSION LINE

ALTERNATE ROUTES

DESIGNED
DRAWN
CHECKED
SUBMITTED F. J. Weiss
RECOMMENDED
APPROVED C. A. Pugh

PHOENIX, ARIZONA MAY 1974
SHEET 2 OF 2
344-330-906

Interior - Reclamation, B.C., Rev. 3-75

Figure 60

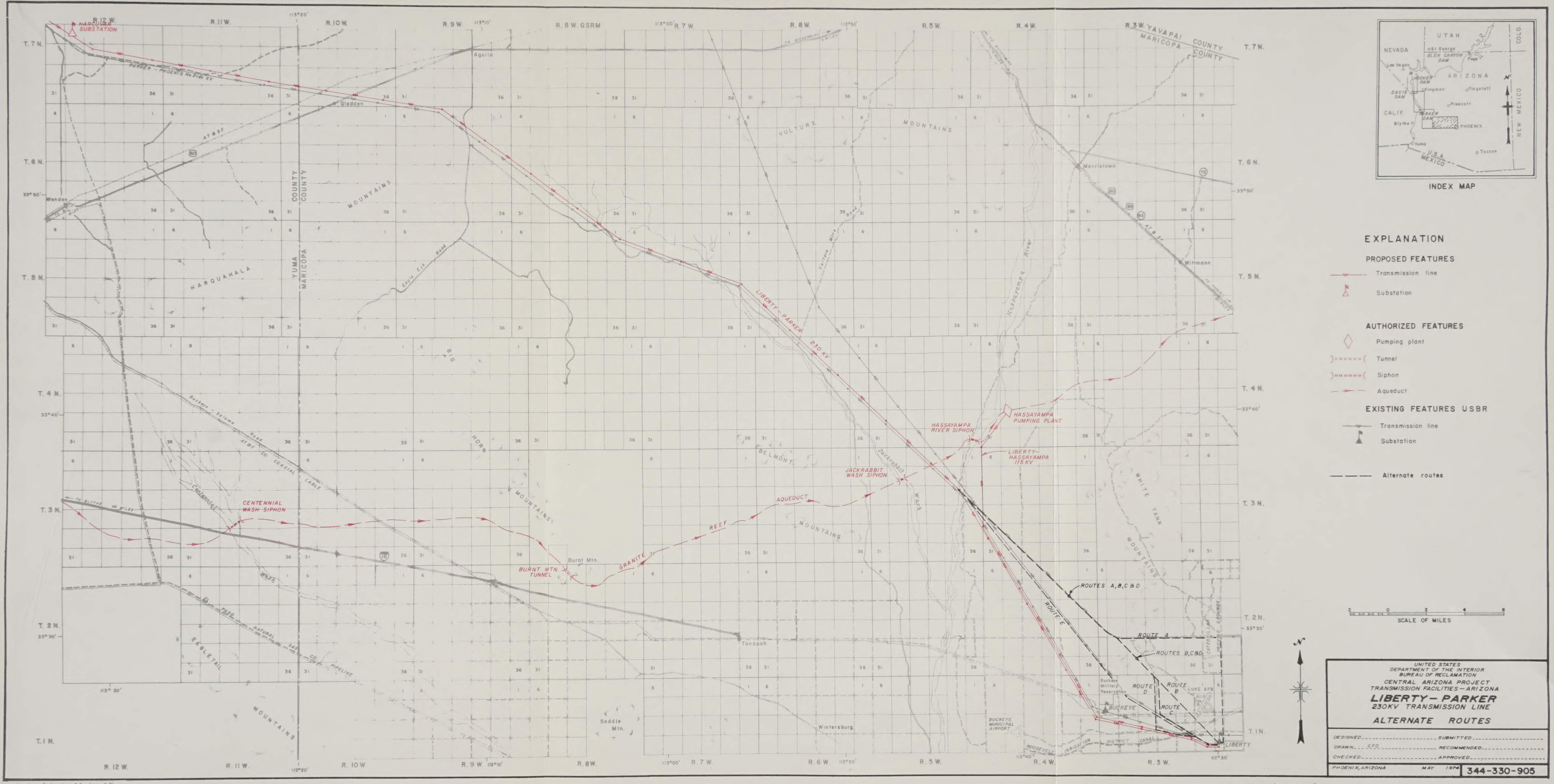


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Figure 61

Plant provides compatibility with the special design of the pumping plant and will eliminate the visual impacts of steel towers. Alternates for the connection (Figure 62) include:

(1) The use of three steel towers for the six-tenths of a mile. The system of towers has proven to be reliable, with maintenance and construction costs more economical than the underground cable installation. The pumping plant is designed to be underground to enhance its appearance and will require structures for the transition from overhead transmission. To reduce the esthetic impacts from overhead suspension towers in the immediate vicinity of the pumping plant, this alternative was not selected.

(2) Underground cable system for the entire route. The planned route is 2.2 miles in length. Routes that cover the entire distance between the switchyard and the pumping plant with underground cables (Figure 62) would either follow the highway (Route B) or the cables would be submerged below the bottom of Lake Havasu (Route A). The distance by either of these routes is approximately 3 miles.

To provide adequate reliability, two parallel underground lines would be required in an underground system. Oil for coolant would be pumped through the conduits in which the cables are installed. The underwater routes open up the possibility of water pollution of Lake Havasu should an oil leak occur. In addition, repair costs for the underwater route would be extremely high.

2. Substations

a. Mead Substation

The proposed transmission system described in Chapter I includes terminal facilities at Mead Substation for both the McCullough-Mead and Mead-Davis 230-kV lines. As described above in the alternative routings of transmission lines, it may be desirable to bypass Mead Substation and route the line directly from McCullough Switchyard to Davis. Studies are currently underway to determine the feasibility of eliminating the tie-in to Mead Substation.

b. Buckskin Substation

Consideration was given to constructing Buckskin Substation in the vicinity of the Havasu Pumping Plant in lieu of tying into Parker Switchyard. Several alternative locations were studied for this substation in the Parker area in order to minimize the environmental impact at the Havasu Pumping Plant.

For each location power would be supplied to the pumping plant by means of underground cables from the remote substation location.

The sites considered as alternatives for the Buckskin Substation as indicated on Figure 62 are as follows:

(1) Site No. 1 approximately 2 miles north of the Havasu Pumping Plant across the Bill Williams River.

(2) Site No. 2 approximately 1.5 miles southwest of the pumping plant.

(3) Site No. 3 approximately 3 miles southeast of the pumping plant on the south side of the Bill Williams River on the existing 69-kV Parker-Bagdad alinement.

After review of economic and environmental factors of constructing a separate Buckskin Substation, it was decided to make use of existing facilities at Parker Dam. There is space for 230-kV breaker bays available at Parker for use by CAP.

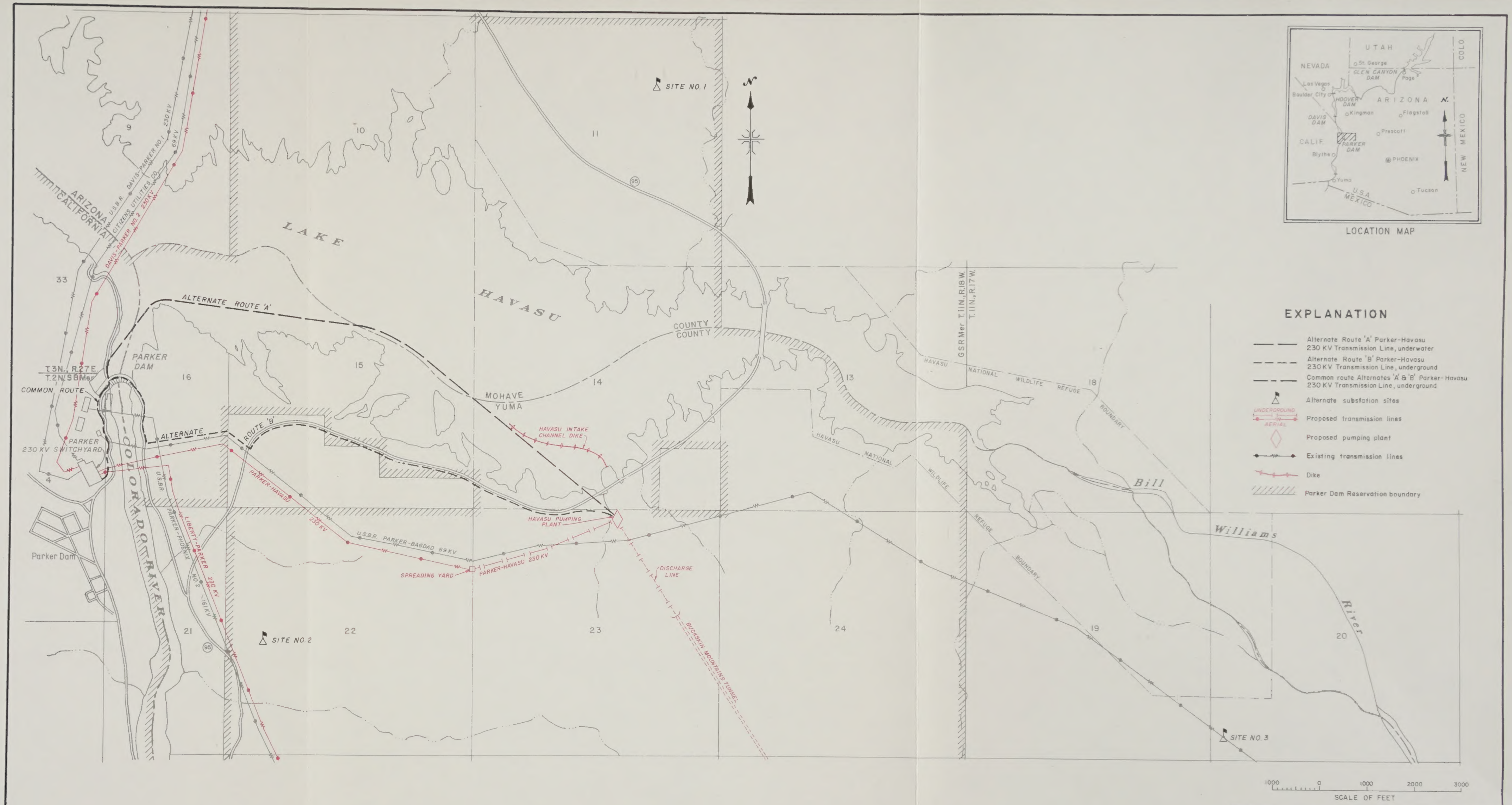
c. Hassayampa Substation [1, 3]

Original plans for the Granite Reef Aqueduct included a pumping plant at Mile 100.5 called Belmont Mountain Pumping Plant. This pumping plant, along with the Hassayampa Pumping Plant at Mile 112.9, was to have been served out of a new Hassayampa Substation which would be built on the Parker-Liberty 230-kV line approximately 25 miles out from Liberty Substation. The Belmont Mountain Pumping Plant was eliminated when the alternative aqueduct route as reported in the Granite Reef Aqueduct final environmental statement was adopted and the optimum method of serving the Hassayampa Pumping Plant was determined to be through a 115-kV transmission line from Liberty Substation, eliminating the necessity for an additional substation on the Parker-Liberty 230-kV line.

d. Harcuvar Substation

An alternate location for the Harcuvar Substation would be approximately 8 miles northeast of the Bouse Hills Pumping Plant on the alinement of the proposed Liberty-Parker 230-kV line. Radial transmission lines, either single- or double-circuited, would be required to the Bouse Hills and Little Harquahala Pumping Plants. This alternate would shorten the overall length of a 115-kV radial transmission line required for the two plants by approximately 6 miles as shown on Figure 60.

Due to age and increased maintenance costs, the Parker-Phoenix 161-kV No. 2 line, placed in service in 1946, will probably be replaced at some future time. Replacement of this line at a higher voltage may require alternative methods of serving the existing Eagle Eye Substation, such as a new feed from the Harcuvar Substation. This alternative location for Harcuvar would require about a 20-mile longer future transmission line to Eagle Eye Substation.



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL ARIZONA PROJECT
TRANSMISSION FACILITIES-ARIZONA

PARKER-HAVASU

230 KV TRANSMISSION LINES

ALTERNATE ROUTES

DESIGNED __________ SUBMITTED __________
DRAWN R. M. Green __________ RECOMMENDED __________
CHECKED __________ APPROVED __________
PHOENIX, ARIZONA MAY 1974 344-330-904

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Figure 62

D. Alternatives in the Design

1. Transmission Lines [1-3, 29, 126-128]

a. Underground Transmission Lines

Present technology for undergrounding high-voltage transmission lines requires the use of high-pressure oil-filled pipe type cable in which the three-phase conductors are each wrapped with paper, covered with metal foil and skid wires, and pulled into a steel pipe. The pipe must be buried in the earth to a depth of 3 to 6 feet, filled with insulating oil, and pressurized. Other requirements for undergrounding include installation of pumping stations to maintain the oil pressure, installation of shunt reactors to absorb the cable-charging current, and installation of cable spreading yards to make the transition from overhead to underground.

Underground construction of the proposed 230-kV transmission lines would require one pumping and shunt reactor station approximately every 30 miles of 230-kV transmission line, or approximately 10 stations for the entire 230-kV transmission system. In addition cable spreading yards would have to be installed at each point the lines terminate such as at a switchyard or substation.

Underground construction of the proposed 230-kV and 115-kV transmission lines would also require that the entire easement for each transmission line be cleared, trenched for cable installation, and backfilled. In the event of rupture of the high-pressure oil-filled cable, oil would leak out into the ground and cause damage to the surface animal and plant life. Repairs to such ruptures, while infrequent, would require extensive excavation and reprocessing of the cable system in order to place the system back in service. Joints for the oil-filled pipe type cable accounts for a substantial portion of its cost. Highly skilled labor for this type of construction is at a premium. River crossings and cliffs require special installation for buried lines as compared to overhead aerial crossings. Riverbeds must be trenched for the cable, then backfilled to cover the pipe. This requires some disturbance of the riverbeds soil deposits and aquatic life. Special cable installation would be required for traversing steep canyon walls and cliffs to provide for the additional internal pressure caused by the hydrostatic head of the oil, in addition to the normal pressure required for cable operation. Underground construction would also necessitate blasting to provide a trench through solid rock formation with accompanying disturbance to the ecology and possibly the general water hydrology. The increased costs, general ecological disturbance, and cable maintenance over overhead construction would nullify any possible benefits of undergrounding the lines.

The cost of underground construction for the proposed 115-kV and 230-kV transmission lines would be approximately ten times as great as for overhead construction. Because of the economics and other reasons discussed above, underground construction was not considered a viable alternative for the majority of the transmission lines except for that portion of line to Havasu Pumping Plant as discussed in Paragraph I.D.3.e.1.

b. Structures

Tubular steel structures for carrying 230-kV conductors are shown on Figures 26, 27 and 32. This type of tower is used extensively in urban locations because it requires less foundation area and the design is more compatible with urban surroundings. Due to a shorter span length allowance for this type structure, increasing the number required, the cost is 70 percent greater than lattice steel installations. In addition, the solid tower is more visible against natural backgrounds than lattice steel and in rural areas not as environmentally desirable.

Wood-pole, H-frame structures of the type shown in Figure 63 are an alternate for lattice steel structures on the 230-kV lines. Wood-pole structures were considered for the Liberty-Parker 230-kV line since it would parallel the existing wood-pole Parker-Phoenix No. 2 161-kV line. However, as explained previously, this existing line will, in all probability, be removed in the future. Also, due to the different voltage ratings of the lines, the new structures would be taller and at different span lengths than the existing line.

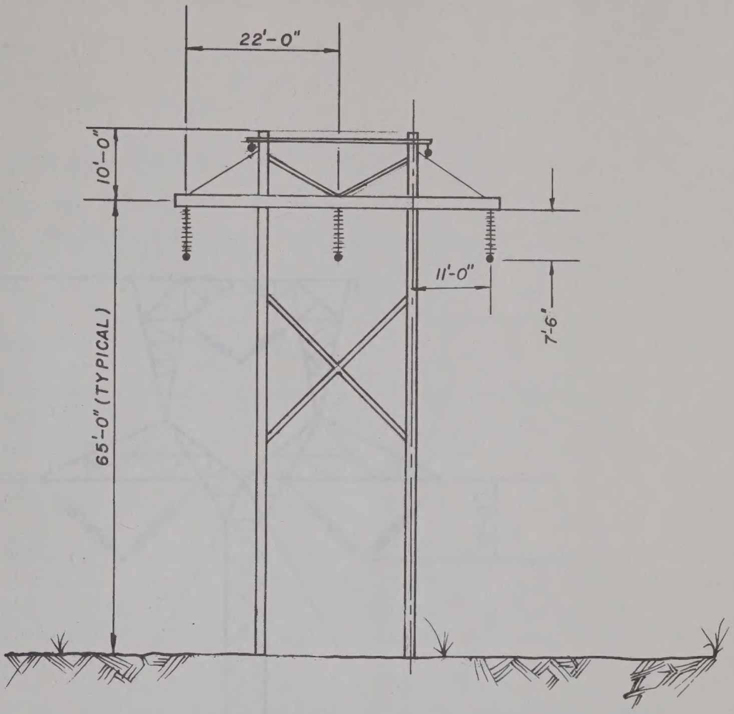
Lattice-steel guyed-type towers were also considered for the 230-kV lines. Figure 64 depicts one type of guyed tower. Guyed towers were found to be undesirable for the following reasons:

(1) Guyed towers require much more land area than free-standing towers because the guys have to be set out further from the centerline of the tower than do the footings of a free-standing tower.

(2) The small guy wires could possibly be a collision hazard to humans, animals and vehicles because of the location in respect to the main body of the structure.

(3) Most of the lines are parallel to existing free-standing lattice-steel type towers.

(4) The Bureau of Reclamation has experienced problems with vandals tampering with guys on one experimental section of guyed towers. Although anchoring methods for guys have improved in recent years, it is still believed that this type of tower is more susceptible to vandalism and sabotage than the free-standing type.



NOTE

Dimensions shown are typical and may change when final designs are completed. They are indicated to show relative sizes of structures for comparison purposes only.

ALWAYS THINK SAFETY

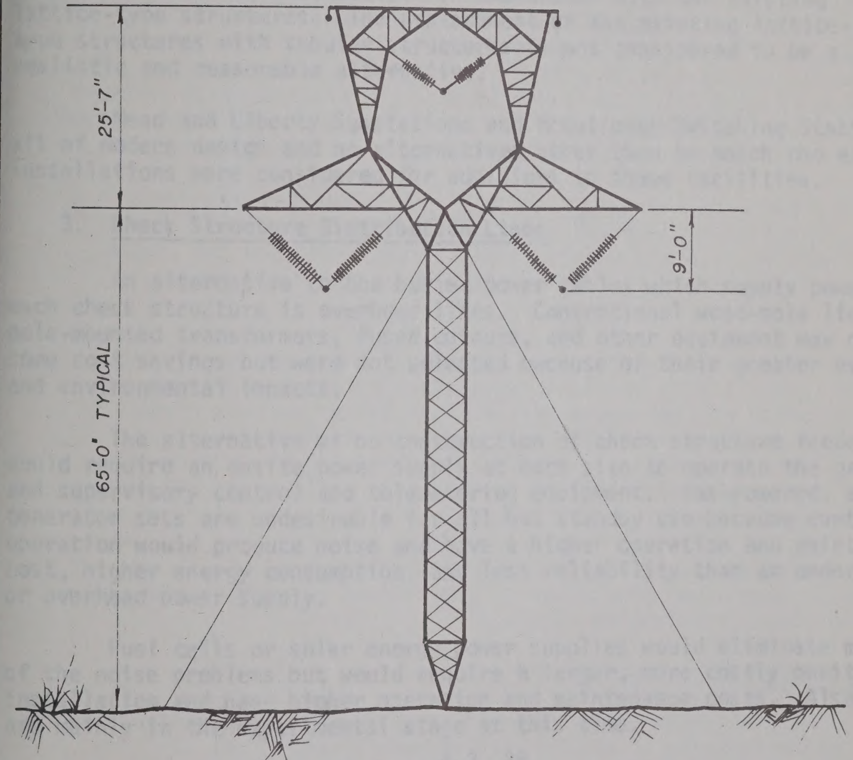
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

230 KV TRANSMISSION LINE
SINGLE CIRCUIT- H- FRAME
WOOD POLE STRUCTURE

DRAWN Bill Logan SUBMITTED
TRACED RECOMMENDED
CHECKED APPROVED

PHOENIX, ARIZONA MAY, 1974 344-330-T-296

Figure 63



NOTE

Dimensions shown are typical and may change when final designs are completed. They are indicated to show relative sizes of structures for comparison purposes only.

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

230 KV TRANSMISSION LINE
SINGLE CIRCUIT
GUYED STEEL LATTICE STRUCTURE

DRAWN Bill Hogan SUBMITTED
TRACED RECOMMENDED
CHECKED APPROVED

PHOENIX, ARIZONA MAY, 1974 344-330-T-295

Figure 64

(5) 230-kV guyed delta towers require more right-of-way. A typical right-of-way width for guyed towers is 155 feet.

c. Alternative Conductor Materials

(Nonspecular Reflective)

2. Switchyards and Substations [128]

Modern design, square tubular steel structures were considered for additions to the Davis and Parker 230-kV Switchyards. These structures would be incompatible in appearance with the existing lattice-type structures. The replacement of the existing lattice-type structures with tubular structures is not considered to be a realistic and reasonable alternative.

Mead and Liberty Substations and McCullough Switching Station are all of modern design and no alternatives other than to match the existing installations were considered for additions to these facilities.

3. Check Structure Distribution Lines [3]

An alternative to the buried power cables which supply power to each check structure is overhead lines. Conventional wood-pole lines with pole-mounted transformers, fused cutouts, and other equipment may offer some cost savings but were not selected because of their greater esthetic and environmental impacts.

The alternative of no construction of check structure feeders would require an onsite power supply at each site to operate the gates and supervisory control and telemetering equipment. Gas-powered, engine-generator sets are undesirable for all but standby use because continuous operation would produce noise and have a higher operation and maintenance cost, higher energy consumption, and less reliability than an underground or overhead power supply.

Fuel cells or solar energy power supplies would eliminate most of the noise problems but would require a larger, more costly onsite installation and have higher operation and maintenance costs. Also, they are mainly in the experimental stage at this time.

E. The Alternative of No Action [1-3, 29]

A no-action alternative would be no construction of the 230-kV backbone power transmission system which extends from McCullough Switching Station near Las Vegas, Nevada, to Liberty Substation, near Phoenix, Arizona, or the radial transmission lines to Havasu, Bouse Hills, Little Harquahala, and Hassayampa Pumping Plants. With no alternative replacement feature, this alternative would preclude meeting the objectives of the CAP as set forth by Congress in Public Law 90-537 and outlined in the overall final environmental statement for Central Arizona Project, FES 72-35.

The impacts of no CAP construction are described in previous CAP environmental statements. The impacts caused by construction of the now existing Havasu Intake Channel Dike will remain as they were previously described in the environmental statement, FES 73-2. Construction of the Buckskin Mountains Tunnel, the Agua Fria and New Rivers siphons and the flood detention dikes for Reach 11 of the Granite Reef Aqueduct will continue to completion. The impacts caused by these dikes are described in the Granite Reef Aqueduct final environmental statement, FES 74-5 and the Havasu Intake Channel, Havasu Pumping Plant, and Buckskin Mountains Tunnel final environmental statement, FES 73-2. The Government would continue to be a participant in the Navajo Project and sell its share of power to other participants. The Parker-Davis Project would continue to maintain the two existing wood-pole 161-kV Parker-Phoenix lines. This would entail replacing these structures when necessary.

Increasing power demands along the Colorado River will require additional generation or transmission facilities at some future time. Other entities will probably construct facilities which are the equivalent of those described in this statement such as the Davis-Parker No. 2, 230-kV line.

Any alternate plan to service the electrical requirements of the Granite Reef Aqueduct Pumping Plants with steam or gas turbines or internal combustion engines would require much larger pumping plant sites. A method of fuel delivery, such as railroad, highway, or pipeline, would have to be constructed to each pumping plant from the fuel source or supply point. All of the suitable fuels available except coal are now in short supply in this area.

At this time, no technically feasible method is available of utilizing solar energy or wind power to provide the electrical requirements of the individual pumping plants.

F. The Alternative of Postponing the Action

The transmission system, as discussed in Chapter I, is a portion of one of the major features of the Central Arizona Project. It performs the primary function of delivering power to the pumps on the Granite Reef Aqueduct. By interconnecting with and replacing a portion of the existing Parker-Davis Project transmission system, it also uprates that system.

The schedule for completion of the transmission line system has been made to coincide with and provide feature operation capability upon the completion of the Granite Reef Aqueduct.

Power to the pumping plants depends on replacement of Parker-Phoenix 161-kV transmission line with a 230-kV Parker-Liberty line or construction of a third line of lesser capacity. In order to provide reliability to the system while this line is being replaced, it is necessary to first install the line between the Davis and Parker Switchyards.

Construction schedule studies to obtain the most efficient and economical use of labor and materials have resulted in the present program. Any postponement of the scheduled starts will cause shortening of the construction schedule and intensifying the performance schedule which will increase costs since it will be required that completion dates still be met.

CHAPTER IX

CONSULTATION AND COORDINATION

IX. CONSULTATION AND COORDINATION

A. Consultation and Coordination During Development of the Proposal and During the Preparation of the Draft and Final Environmental Statements

Coordination with local entities, public and private, has been affected during the process of statement preparation and facility planning location and design. A knowledge of the complexity of multiownership power generation, transmission, and supply has been but one element of the coordination and cooperation. Knowledge and familiarity with the planning and goals of future power generation units and existing facilities are part of the background required to develop the plan for the system and alternatives as described.

Map No. 743-300-1 (Figure 37) shows the interconnected nature of the system in the southwest United States that integrates and interconnects hydroelectric and thermal generation units in Arizona, southern California, southern Nevada, Utah, and western New Mexico. The WSCC (Western Systems Coordinating Council) is a formal coordinating organization of which the Bureau of Reclamation is a member. Planning to meet loads during the periods that this transmission system will be under construction and the initial pumping of project water indicate that the units shown on Table 9 have reached the stages of extensive detailed environmental studies and preliminary designs.

Table 9 indicates the numerous plants of entities that are forthcoming in the relatively near future (5 to 10 years). General and specific discussions with technical, planning, and environmental personnel of the Arizona Public Service Company (APS), Salt River Project (SRP), Bureau of Land Management, Arizona State Land Department, Arizona Atomic Energy Commission, and Citizens Utilities Company indicate that Reclamation may expect future interconnections with the Liberty, Westwing, Pinnacle Peak, Mesa, Coolidge, and Tucson substations or switching yards. These interconnections would result from the Palo Verde Nuclear Generating Station (PVNGS), Cholla Powerplant addition, and the Coronado Generating Station. As an example from the Palo Verde Nuclear Generating Station, one connection would be to the Westwing Substation, one to the SRP Kyrene Substation and Powerplant possibly through the Liberty Substation, one line to the APS Saguaro Plant and one to the Tucson Gas and Electric Vail Substation. The Vail Substation is a terminus for the San Juan-Vail Line, and Saguaro is a terminus for the Cholla (APS) Powerplant addition.

It has been estimated that the electric power requirements in this Region are expected to increase by nine times between 1972 and 1990. Even if the estimated demand reaches a lesser magnitude or extends over a longer period of time, the listed projects are an indication of the magnitude and early time frame of some of the facilities which will be required to serve this upcoming load.

TABLE 9
PLANNED PLANTS AND ADDITIONS

Organization	Use	Unit	Capacity	Type	Location
Bureau of Reclamation	Load	Desalting Unit	-	-	Yuma, Arizona
APS Company	Generation	Palo Verde Nuclear Power Project	3,810 MW	Nuclear	Wintersburg, Ariz.
APS Company	Generation	Cholla Plant Addition	850 MW	Coal	Joseph City, Ariz.
Salt River Project	Generation	Coronado Power Station	1,050 MW	Coal	Near St. John, Arizona
WEST	Generation	Kapairowitz	3,000 MW	Coal	Southern Utah
San Diego Gas & Electric Co.	Generation	Sun Desert	1,140 MW	Nuclear	Near Blythe, California
Southern California Edison	Generation	Palo Verde Valley	1,520 MW	Nuclear	Vidal Junction, Colorado
LADWP	Generation	Earp Generating Station	N/A	Nuclear	Earp, California
Arizona Power Authority	Generation	Montezuma Pumped Storage	500 MW	Hydro	Gila River Indian Reservation
Arizona Electric Power Cooperative	Generation	Apache	350 MW	Coal	Cochise, Arizona
Nevada Power Company	Generation	Allen Project	2,000 MW	Coal	Near Las Vegas, Nevada
Nevada Power Company	Generation	Reid Gardner Addition	125 MW	Coal	Moapa Valley, Nevada
Nevada Power Company	Generation	Warner Valley	500 MW	Coal	St. George, Utah

1. State and Local Participation in the Development of the Draft Environmental Statement

In accordance with Reclamation Instructions 376.5.8C. and the procedure of Appendix IV of the Council on Environmental Quality guidelines of August 1, 1973, a notice was sent to the State Clearinghouses of Arizona, California, and Nevada that a draft environmental statement for the Granite Reef Aqueduct Transmission System between McCullough Switching Yard in Nevada and Liberty Substation in Arizona was in the process of preparation and pertinent data or information from the agencies participating in the OMB A-95 clearinghouse review procedure was requested. The nature of the forms used for notification of the initiation limited the amount of information on the notice and the accompanying general location map was not in detail.

A listing of those agencies choosing to comment on the notification, as well as copies of their comments were included in the draft environmental statement. The draft statement has received an extensive review by the public in general and comments received by the Bureau of Reclamation as a result of this review are included in Appendix A of this final environmental statement. Because this statement has been reviewed as a draft, the original letters of comment on the initial notification have not been included in this final statement.

The State of Arizona has a Powerplant and Transmission Line Siting Committee that is composed of 18 members drawn from the following: State Attorney General, State Land Commissioner, Chairman, Water Quality Control Board; State Health Department; Director, State Air Pollution Control Division, State Health Department; Director, Game and Fish Department; Executive Director, Arizona Water Commission; Office of Economic Planning and Development; Chairman, Corporation Commission; Chairman, University of Arizona Department of Anthropology; Director, State Parks Department; Director, Arizona Atomic Energy Commission; two public members, two members from and representing city governments, two members from and representing county governments, and one landscape architect. Most of the membership is notified for coordination of input through their capacity as State or local agency administrators who receive notification through the State Clearinghouse procedure. This committee has no jurisdiction over siting of Federal facilities but has been notified separately for information and coordination purposes.

2. Coordination with Federal Agencies in the Preparation of This Final Environmental Statement

Federal agencies that have been consulted in the preparation of this environmental statement include the Bureau of Land Management (which has jurisdiction over much of the Federal land that the transmission line will traverse), the National Park Service's Arizona Archeological Center (which coordinated studies for inventorying the archeological resources existing along the alinement) and the Fish and Wildlife Service (for its particular interest in the alinement of Alternate No. 2 along Burro Creek).

3. Involvement of the Central Arizona Project Environmental Advisory Group in the Preparation of this Draft Environmental Statement

The Central Arizona Project Environmental Advisory Group was established by the Commissioner of the Bureau of Reclamation in 1971 for the purpose of affording the general public an opportunity to actively participate with Reclamation in an advisory capacity on environmental planning for the CAP. The advisory group is a seven-member committee listed as follows:

Name	Organization Represented
Mrs. Stephen Detzer	League of Women Voters
Mr. Rich Johnson	Central Arizona Project Association
Mr. Ray Killian	Central Arizona Water Conservation District
Mr. F. J. MacDonald	Advisory Commission on Arizona Environment
Mr. Tom Sullivan	Arizona Wildlife Federation
Mr. Brent W. Brown	Office of Economic Planning and Development
Mr. F. Phillip Sharpe	Bureau of Reclamation

This group has reviewed the advance working draft and the published draft of the environmental statement.

4. Dissemination of CAP Information Through the News Media

The CAP has received considerable attention from the news media in Arizona through radio and television coverage, newspaper articles, and public presentations. The CAP has been the subject of special programs on Phoenix television stations in August 1972, January 1973, and July 1974. Information on the project was on the front pages of most Arizona newspapers when on December 15, 1972, the Secretary of the Interior signed the master water repayment contract for the project, and on January 11 and 12, 1973 as an item discussed and commented on during the National Water Commission field hearings in Phoenix. The Arizona State Legislature has held hearings on the project. The filings of final environmental statements on the Havasu complex (FES 73-2) and the Granite Reef Aqueduct (FES 74-5) and its attendant public hearing on May 2 and 3, 1973 resulted in further publicity. Water contract negotiations for municipal and industrial water and for an allocation by the Secretary of the Interior are the subject of frequent articles by the news media.

B. Coordination and Distribution of the Draft Environmental Statement for Review Purposes

The draft environmental statement was distributed to the Federal agencies that have expertise or authority in subject areas covered by the statement and to the other Federal offices which provided information for the development of this statement. Additional distribution was made to State and local agencies and private entities shown on the distribution list at the front of the statement. Additional requests for single copies of the statement were filled as received after the notice appeared in the Federal Register and the news release on the statement was published. All written comments on the draft environmental statement received during the review period are included as Appendix A to this final environmental statement. Copies of all written comments received after the end of the review period and prior to reprinting have also been included in Appendix A. Copies of the draft statement were made available to the public at most public and university libraries in Arizona and southern Nevada.

C. Public Hearing on Draft Environmental Statement

A public hearing was held at Lake Havasu City on December 19, 1974, to hear scheduled and unscheduled speakers comments on the draft environmental statement. To accommodate persons who might not be able to be present at a daytime hearing, the hearing was scheduled for 2 p.m. and 7 p.m. Notification of the public meeting was made through newspaper articles in general and local circulation, announcements on radio stations, and publication in the Federal Register. Newspapers carrying articles on the availability of the DES and the public hearing included: Arizona Republic, Phoenix Gazette, Arizona Daily Star, Tucson Daily Citizen, Havasu Enterprise, and the Las Vegas Review Journal and Las Vegas Sun.

An Administrative Law Judge of the Department of the Interior conducted the hearing. A panel of five Reclamation officials comprised the hearing board. The officials were the:

Regional Director, Boulder City, Nevada
Regional Environmental Specialist, Boulder City, Nevada
Associate Projects Manager, Arizona Projects Office, Phoenix, Arizona
Construction Engineer, Arizona Projects Office, Phoenix, Arizona
Projects Environmental Engineer, Arizona Projects Office, Phoenix, Arizona

The hearing was recorded and a copy of the 19-page hearing record is available for public examination at the following locations:

Bureau of Reclamation, Interior Building, Room 7622, Washington, D.C.,
Telephone No. 203-343-4991

Technical Services Branch, Division of Engineering Support,
E&R Center, Denver Federal Center, Denver, Colorado,
Telephone No. 303-234-3006

Office of the Regional Director, Environmental Clearinghouse,
Room 210, Administration Building, Boulder City, Nevada,
Telephone No. 702-293-8618

Bureau of Reclamation, Arizona Projects Office, 135 North Second
Avenue, Phoenix, Arizona, Telephone No. 602-261-3791

For the 2 p.m. hearing session there were 16 persons in attendance other than hearing officials and staff. One scheduled comment was heard. No persons asked to be heard who had not registered to comment in accord with the prehearing notice of the hearing. The hearing session was adjourned at 2:20 p.m. to be reconvened at 7 p.m. The 7 p.m. hearing session was attended by 8 persons other than the hearing officials and staff. One previously unscheduled speaker registered to comment. This speaker was provided a copy of the DES in the event that he wished to provide subsequent specific written comments on the DES. The evening hearing session was closed by the presiding officer at 7:15 p.m., in the absence of any further individuals indicating an interest in making comments. One individual present at both sessions recorded the hearing on a portable tape recorder. Two representatives from news media were present at the 2 p.m. session. Summaries and response to the comments are given in Appendix A of this final environmental statement. No written supplemental comments for inclusion in the hearing record were received during the 10-day period following the hearing.

The relevant comments on the draft statement made at the hearing have been taken into consideration in the preparation of this final environmental statement. The contents of the transcript have been thoroughly analyzed and all suggestions have been evaluated as to practicality for incorporation into the project plan. Responses to pertinent comments regarding the Granite Reef Aqueduct Transmission System are presented in Appendix A in a comment and reply section.

APPENDIX A

WESTERN CONFERENCE OF OPERATING ENGINEERS
OF THE INTERNATIONAL UNION OF OPERATING ENGINEERS

Department of Research and Statistics
T. E. REED, Director
2555 FLORES STREET, SUITE 390 · SAN MATEO, CALIFORNIA 94403
Area Code 415: 341-2121

RUSSELL CONLON
President

ROBERT H. FOX, JR.
Vice-President

J. J. TWOMBLEY
Secretary-Treasurer

E. A. Lundberg, Regional Director
Lower Colorado Regional Office
Bureau of Reclamation
U.S. Department of the Interior
P.O. Box 427
Boulder City , Nevada 89005

Dear Mr Lundberg:

The draft Environmental Statement of the Transmission System Granite Reef Aqueduct is another product you and the many contributors can be justly proud. As in earlier drafts and final statements of the Aqueduct you have enabled and recorded the many positions both positive and negative from a number of interested groups.

As in the Granite Reef Aqueduct, the Transmission System lays out the total scope of the plan indicating the placement and corresponding impacts to the biota of the area.

During the construction phase thru 1985 many Arizonian labor skills will be employed giving the Arizonian Construction sector a continuous insurance to the workers and their families of stable employment. The Operating Engineers in Local 428 covering the entire State of Arizona will benefit from this project. Equally important will be the improvement to all the other sectors of the Arizona economy.

It is my hope that future economic impact statements will be designed which will enable more groups like ours to compliment the fine work you have assembled in the environmental area. In this way a truly balanced view of the impacts to people, environment, economy and recreation can be assesed.

Thank you for this opportunity to present our support for this project.

Sincerely,

T.E.Reed
Director, Res. & Stat.

c.c. J.J. Twombley

TER/r

Reply to Comments Made by
Western Conference of Operating Engineers
San Mateo, California
(Undated Letter Received November 29, 1974)

Comments contained in this letter are generally favorable to the project and no reply is considered necessary.

Nove~~mber 29, 1974~~

United States Department of the Interior
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

Re: Draft Environmental Statement, Granite ~~Reef Adueduct~~
Transmission System (INT DES 74-105)

Gentlemen:

The Frank Lloyd Wright Foundation has reviewed the draft statement and offers the following comments for your consideration.

An important impact of transmission line construction is the "recreational" vehicle traffic into heretofore inaccessible areas made possible by the construction and maintenance road. Our buildings are immediately adjacent to the Pinnacle Peak/Ocotillo transmission line and over the last 15 years we have had ample opportunity to observe indiscriminate use of the transmission corridor road by recreationalists. This use has resulted in a massive abuse of the surrounding desert, vandalism and pilferage to homes along the right of way.

The remark contained in the draft statement by the Arizona Game Department that the line will undoubtedly close the Harquahala Mountains to bighorn sheep is another example of the impact of these roads.

However, there is no reason why the effects of the maintenance roads could not be overcome by intelligent layout and design. Unlimited access to remote areas could be controlled. The Salt River Project no longer requires maintenance roads to be continuous between access points. Consideration to blocking roads midway between established access points should be studied.

THE FRANK LLOYD WRIGHT FOUNDATION
OPERATING DIVISIONS
TALIESIN ASSOCIATED ARCHITECTS
FRANK LLOYD WRIGHT SCHOOL OF ARCHITECTURE

TALIESIN WEST • SCOTTSDALE, ARIZONA 85252
602 + 948-6400 TELEX: 667-499 CABLE: TALIESIN

Fencing and blocking off access would undoubtedly be effective in the case of the Harquala Mountains. The Arizona Game and Fish Department could identify control points which would be effective in controlling intrusions into the diminishing habitat of the bighorn sheep.

Secondly, the lattice tower design elements could be improved upon. There is no need for these towers to have their strange "praying mantis" appearance. The proposed silver paint does not blend really with anything even if it does become basic gray eventually. An investigation should be made of other paint schemes relating to the actual viewed backgrounds.

Lastly, we are sure that you share with us the conviction that the removal of transmission lines from the skyline is the only eventual solution for the State of Arizona's growing needs for power distribution. The number of overhead grids that apparently would be required for a doubling of the population, we believe, will become unacceptable even to the most environmentally unresponsive persons.

Thank you for the opportunity to comment on the Draft Statement.

Sincerely yours,

Tony Puttnam
for The Frank Lloyd Wright Foundation

TP/lv

Replies to Comments Made by
Tony Puttnam, Frank Lloyd Wright Foundation
(Letter of November 29, 1974)

1. Comment: An important impact of transmission line construction is the "recreational" vehicle traffic into heretofore inaccessible areas made possible by the construction and maintenance road. Our buildings are immediately adjacent to the Pinnacle Peak/Ocotillo transmission line and over the last 15 years we have had ample opportunity to observe indiscriminate use of the transmission corridor road by recreationalists. This use has resulted in a massive abuse of the surrounding desert, vandalism and pilferage to homes along the right-of-way.

   Reply: The predominent landownership of right-of-way for the Granite Reef Aqueduct Transmission System is in either Federal public land or State land status. Throughout this statement the anticipated impacts of off-road vehicle users are discussed. Multiple-purpose management of Federal and State lands for purposes of range management and outdoor recreation with road nets created for those management purposes is considered by Reclamation to be in the best interests of the citizens of Arizona, Nevada, and the United States. The transmission line access roads serve these additional functions over most of the system length. The referred to Pinnacle Peak/Ocotillo line of the Arizona Public Service Company is on rights-of-way obtained from the State of Arizona on land leased by the Foundation from the State. The Pinnacle Peak/Ocotillo Transmission Line passes in front of the Foundation property at the place referred to. The transmission system for the Granite Reef Aqueduct does not traverse populated areas, hence the impacts of vandalism and pilferage to homes alleged to occur as a result of construction of the Pinnacle Peak/Ocotillo line are not expected to occur.

2. Comment: The remark contained in the draft statement by the Arizona Game Department that the line will undoubtedly close the Harquahala Mountains to bighorn sheep is another example of the impact of these roads.

   Reply: The Arizona Game and Fish Department commented in a letter dated December 12, 1974, copy contained in this Appendix, that after a review of the draft environmental statement they do not have any major conflict with the proposed alinements with respect to their impacts on bighorn sheep populations within the state of Arizona.

3. Comment: However, there is no reason why the effects of the maintenance roads could not be overcome by intelligent layout and design. Unlimited access to remote areas could be controlled. The Salt River Project no longer requires maintenance roads to be continuous between access points. Consideration to blocking roads midway between established access points should be studied.

Fencing and blocking off access would undoubtedly be effective in the case of the Harquahala Mountains. The Arizona Game and Fish Department could identify control points which would be effective in controlling intrusions into the diminishing habitat of the bighorn sheep.

Reply: Construction roads for lines that do not parallel existing lines will be either removed, blocked, or posted to help prevent intrusion into relatively unspoiled areas. Some of the roads to be affected are the routes around Lake Havasu City, Harcuvar to Bouse Hills where it does not parallel the Parker-Phoenix No. 2 line, and Harcuvar to Little Harquahala line. New gates or cattle guards in right-of-way fencing will be required when the lines cross highways, of not already installed.

4. Comment: Secondly, the lattice tower design elements could be improved upon. There is no need for these towers to have their strange "praying mantis" appearance. The proposed silver point does not blend really with anything even if it does become basic gray eventually. An investigation should be made of other paint schemes relating to the actual viewed backgrounds.

Reply: The design configuration of the conductor-supporting structure is discussed in Section VII.D.1.b. and illustrated in Figures 28, 29, 34, 62, and 63. The different structure design styles have been in a continuing stage of modification for differing terrain, location, loading, and rights-of-way criteria or limitations including economics. The design chosen is considered the most economical type of structure available. Other designs for lattice-type structures would, in all probability, be equally obtrusive and require more of the structure for the same miles of line. Painting of the transmission line tower in lieu of using the proposed galvanized metals would require excessive maintenance in later years besides having a very high initial cost.

Long term and continuing operation and maintenance programs have examined painting of structures to tones related to the backgrounds. One such trial has been on the Lake Mead National Recreation Area where the towers adjacent to a like crossing were a blending brown tone. The additional costs of painting and a maintenance policy of periodic painting or no replacement of weathered paint also would influence the impact upon the maintenance road use by traffic for painting purposes primarily.

5. Comment: Lastly, we are sure that you share with us the conviction that the removal of transmission lines from the skyline is the only eventual solution for the State of Arizona's growing needs for power distribution. The number of overhead grids that apparently would be required for a doubling of the population, we believe, will become unacceptable even to the most environmentally unresponsive persons.

Reply: In the future, research and technology may develop a feasible method of placing long transmission lines underground or transmit electrical energy by another means. Currently, the only reasonable alternative is to transmit electrical power via overhead transmission lines.

Hemet,Ca92343
November 29th 1974

Bureau of Reclamation
Box 427
Boulder City,NV

Dear Sir.

Thanks for sending me the copy of the Draft Environmental Statement of the Granite Reef Aqueduct. Transmission System.(INT DES 74-105) In regards to the Design of the Harcuvar Substation. The following Drawings from SPEC DC-6459 Liberty Substation should be included in the final satement. because they show the type of layout of struct planed at Harcuvar Substation: Here abe the list of Drawings: Liberty Substation - 1046-D-124 to 130.

Again thanks for sending me this very interesting report.

Sincerely yours
John R Nicholson
John R Nicholson
P.O. Box 429
Hemet,Ca92343

Reply to Comment Made by
John R. Nicholson
Hemet, California
(Letter of November 29, 1974)

1. Comment: In regard to the design of the Harcuvar Substation, the following drawings from SPEC DC-6459 Liberty Substation should be included in the final statement because they show the type of layout of structures planned at Harcuvar Substation. Here is the list of drawings: Liberty Substation - 1046-B-124 to 130.

Reply: The referenced drawings from Specification No. DC-6459 were examined. The use of photographs for illustrations is believed to be more informative to the general public and to most of the commenting reviewers. The detailed construction drawings contained in specifications would be too technical for most readers and reviewers and may not be applicable to the detailed construction plans for the proposed Harcuvar Substation.

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION
WASHINGTON, D.C. 20250

December 4, 1974

Mr. William F. Graham
Acting Assistant Commissioner
Bureau of Reclamation
U.S. Department of the Interior
Washington, D. C. 20240

Dear Mr. Graham:

In response to your letter of November 15, 1974, to Dr. Tschirley, we have reviewed the draft environmental statement for the Granite Reef Aqueduct Transmission System, Central Arizona Project, Arizona-New Mexico, and have no suggestions or comments.

Sincerely,

For WALTER J. CLAYTON
Director, Office of Program
Development and Analysis

Reply to Comment Made by
United States Department of Agriculture
Rural Electrification Administration
Washington, D.C.
(Letter of December 4, 1974)

No reply to this letter is considered necessary.

ARIZONA DEPARTMENT OF TRANSPORTATION
206 South Seventeenth Avenue Phoenix, Arizona 85007

JACK WILLIAMS
Governor

HIGHWAYS DIVISION
WILLIAM A. ORDWAY
Director

December 5, 1974

Mr. E. A. Lundberg
Regional Director
Bureau of Reclamation
Lower Colorado Regional Office
Post office Box 427
Boulder City, Nevada 89005

Re: Granite Reef Aqueduct
Transmission System
INT DES 74-105
Draft Environmental Statement
State Application Identifier:
74-80-0072

Dear Mr. Lundberg:

The Environmental Planning Services of the Arizona Highways Division has reviewed the Granite Reef Aqueduct Transmission System INT DES 74-105 Draft Environmental Statement.

As is pointed out on page 43 of the study, the transmission lines will make several crossings over State and U.S. Highways. At these locations, no change in the use of roadways will be made except possibly for some unforeseen minor delays to the highway users during the time of the crossing construction. This certainly is a reasonable assessment and the impact upon the highways should not be significant.

We appreciate the opportunity to review and make comment on the Draft Environmental Statement.

Yours very truly,

WM. N. PRICE
State Engineer

Mason J. Toles

MASON J. TOLES, Manager
Environmental Planning Services

MJT:ADG:jh

Enclosure

cc: Constance LaMonica

Reply to Comment Made by
Arizona Department of Transportation
Phoenix, Arizona
(Letter of December 5, 1974)

The comments contained in this letter are generally favorable and no reply is considered necessary.

FLOOD CONTROL DISTRICT of Maricopa County

3325 West Durango Street • Phoenix, Arizona 85009 • Telephone (602) 262-3630/262-3639

December 6, 1974

Mr. E. A. Lundberg, Regional Director
United States Department of the Interior
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

RE: Review of Draft Environmental Statement; Granite Reef Aqueduct Transmission System

Dear Mr. Lundberg:

Our office has the following comments on the referenced report:

> Item-II,G - "... Because of infrequent flow and small quantities of runoff, stream gaging stations have not been installed generally, and hydrologic records are incomplete or nonexistent for attempting to quantify the runoff." (p. 73)

This statement seems to imply that there is not a basis for hydrologic analysis of drainage. We request a rewording to better reflect the intent of this statement.

> Item-III,B,2,b(1) - "... Tower sites will be located far enough away to avoid flood hazard and not cause damage to wash bottom vegetation." (p. 108)

Here again we request amplification in the final statement whether hydrologic analyses will be made to determine "far enough away," and if so, what the design flood frequency will be.

> Item-IV,B,2 - "... Proper drainage control will be provided for any roads that are required and areas that are damaged will be restored." (p. 139)

We request assurance that drainage control will not divert flows from one watershed to another. However, if this is unavoidable, we wish to be kept up-to-date on specific locations for drainage which originates within or crosses portions of Maricopa County.

If you have any questions on our suggested revisions, please call me on (602)-262-3630.

Sincerely,

Bill Jolly

HERBERT P. DONALD, P.E.
Chief Engineer and General Manager

Bill Jolly, P.E.
Engineer

HPD/BJ/ly

Replies to Comments Made by
Flood Control District of Maricopa County
Phoenix, Arizona
(Letter of December 6, 1974)

1. Comment: Item II,G - "...Because of infrequent flow and small quantities of runoff, stream gaging stations have not been installed generally, and hydrologic records are incomplete or nonexistent for attempting to quantify the runoff." (p. 73)

   This statement seems to imply that there is not a basis for hydrologic analysis of drainage. We request a rewording to better reflect the intent of this statement.

   Reply: The section has been amplified to indicate that the records for volume of annual runoff are few but that stormflow peaks are determined by empirical hydrometeorological prediction techniques as required for the specific situation.

2. Comment: Item III,B,2,b(1) - "...Tower sites will be located far enough away to avoid flood hazard and not cause damage to wash bottom vegetation." (p. 108)

   Here again we request amplification in the final statement whether hydrologic analyses will be made to determine "far enough away," and if so, what the design flood frequency will be.

   Reply: This section has been amplified. Where loss of life or damage to property can occur, the general hydraulic control structure design frequency is a minimum period of 50 years, but on major hydraulic control structures may be 100 years or more. Tower sites are amongst other criteria based on visual evidence of high water marks from flooding.

3. Comment: Item IV,B,2 - "...Proper drainage control will be provided for any roads that are required and areas that are damaged will be restored." (p. 139)

   We request assurance that drainage control will not divert flows from one watershed to another. However, if this is unavoidable, we wish to be kept up-to-date on specific locations for drainage which originates within or crosses portions of Maricopa County.

   Reply: The drainage control developed on unimproved roads and its extent is probably best illustrated by the roads shown crossing desert terrain in Figure Nos. 12, 46, 47, and 48. Drainage from one watershed to another would be done only under exceptional conditions. Most of the line in Maricopa County would be parallel to the existing Parker-Phoenix No. 2 line by replacing the No. 1 line.

RAYMOND R. RUMMONDS
CHAIRMAN AND COLORADO RIVER COMMISSIONER
COACHELLA VALLEY COUNTY WATER DISTRICT
RAYMOND E. BADGER
SAN DIEGO COUNTY WATER AUTHORITY
JOSEPH JENSEN
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
HAROLD F. PELLEGRIN
EXECUTIVE SECRETARY
VIRGIL L. JONES
PALO VERDE IRRIGATION DISTRICT
ROBERT V. PHILLIPS
DEPARTMENT OF WATER AND POWER, CITY OF LOS ANGELES
CARL C. BEVINS
IMPERIAL IRRIGATION DISTRICT
MYRON B. HOLBURT
CHIEF ENGINEER

STATE OF CALIFORNIA
Colorado River Board of California
107 SOUTH BROADWAY, ROOM 8103
LOS ANGELES, CALIFORNIA 90012

December 12, 1974

Mr. Edward A. Lundberg, Regional Director
Lower Colorado Regional Office
Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

We have received a copy of the Draft Environmental Statement on the Granite Reef Aqueduct Transmission System, Central Arizona Project, enclosed with your letter of November 15, 1974.

We have reviewed the statement and have no comments to offer.

Sincerely yours,

B. Holburt

Myron B. Holburt
Chief Engineer

Reply to Comment Made by
Colorado River Board of California
Los Angeles, California
(Letter of December 12, 1974)

No reply to this letter is considered necessary.

Governor
JACK WILLIAMS

missioners
ILTON G. EVANS, Chairman, Flagstaff
OBERT J. SPILLMAN, Phoenix
ILLIAM H. BEERS, Prescott
HARLES F. ROBERTS, O.D., Bisbee
RANK FERGUSON, JR., Yuma

Director
ROBERT A. JANTZEN

Asst. Director, Operations
PHIL M. COSPER

Asst. Director, Services
ROGER J. GRUENEWALD

ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

1

120

December 12, 1974

Mr. E. A. Lundberg, Regional Director
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

We have again contacted our field biologists concerning the proposed Granite Reef Aqueduct Transmission System. The following comments pertain to your Draft Environmental Statement, dated November 14, 1974.

As you know, the Granite Wash and Harquahala mountain ranges both contain important populations of bighorn sheep that are already receiving excessive human pressure. The inevitable road that would accompany a new utility route through these mountains would create an additional means of access not tolerable to the sheep in these areas.

After reviewing your DES, however, it appears that the proposed 115-KV Harcuvar-Little Harquahala transmission line, as depicted in Figure 7 (pp. 12-13), would miss the main bighorn sheep areas. The line apparently would not cross the Granite Wash Mountains, the most important bighorn sheep habitat in this particular vicinity. In addition, Figures 30-31 (pp. 33-34) do not show the proposed line as crossing any important mountain masses. If these figures are accurate, we do not find any major conflict with the route selected for this proposed transmission line.

Our Department would like to reemphasize the existence of bighorn sheep in the Bighorn Mountains and the populations of desert mule deer and small game species on the desert floor surrounding them.

The opportunity to review and comment on this DES is appreciated. If we can be of further assistance, please notify us.

Sincerely,

Robert A. Jantzen, Director

Bruce R. Duke

By: Bruce R. Duke, Specialist
Planning and Evaluation Branch

BRD/cs
cc: Mrs. Constance LaMonica, Arizona State Clearinghouse
Mr. Tony Putnam, Frank Lloyd Wright Foundation

Replies to Comments Made by Arizona Game and Fish Department Phoenix, Arizona (Letter of December 12, 1974)

1. Comment: As you know, the Granite Wash and Harquahala Mountain ranges both contain important populations of bighorn sheep that are already receiving excessive human pressure. The inevitable road that would accompany a new utility route through these mountains would create an additional means of access not tolerable to the sheep in these areas.

After reviewing your draft environmental statement, however, it appears that the proposed 115-kV Harcuvar-Little Harquahala transmission line, as depicted in figure 7 (pp. 12-13), would miss the main bighorn sheep areas. The line apparently would not cross the Granite Wash Mountains, the most important bighorn sheep habitat in this particular vicinity. In addition, figures 30-31 (pp. 33-34) do not show the proposed line as crossing any important mountain masses. If these figures are accurate, we do not find any major conflict with the route selected for this proposed transmission line.

Reply: This comment appears to support Reclamation's contention that the Granite Reef Aqueduct transmission line will have little significant impact on the bighorn sheep population of Arizona.

2. Comment: Our Department would like to reemphasize the existence of bighorn sheep in the Bighorn Mountains and the populations of desert mule deer and small game species on the desert floor surrounding them.

Reply: There are no lines of this transmission system that are located within 8 miles of the Bighorn Mountains. In the Department's July 30, 1974, letter they "probably assume that the proposed transmission line system would pass adjacent to the Bighorn Mountains." As can be seen from Figure No. 6, this is not the case.

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Nevada State Office
Room 3008 Federal Building
300 Booth Street
Reno, Nevada 89502

IN REPLY REFE
1792
(N-911.4

DEC 13 1974

Mr. E. A. Lundberg
Regional Director
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 4027
Boulder City, Nevada 89005

Dear Sir:

We have completed a review of the draft environmental impact statement for the Granite Reef Aqueduct Transmission System, INT-DES-74-105.

For the most part these transmission lines follow existing corridors in both the proposed action and alternatives (see figures 3 and 55). However, these lines do diverge somewhat from the existing corridors especially in the Davis Dam area.

The impacts upon aesthetics of these departures as well as the attendant access roads are not discussed nor for that matter are the visual impacts of an additional line along side of the existing lines. Each additional line detracts from the general scenery of the area until all one sees is a maze of towers and wires. Impacts of this sort should be discussed.

In general the statement is adequate, however, additional data relating to Nevada is available and possibly could be included to good advantage.

Sincerely,

E. I. Rowland
State Director, Nevada

CONSERVE
AMERICA'S
ENERGY

Save Energy and You Serve America!

Replies to Comments Made by
Nevada State Office
Bureau of Land Management
Reno, Nevada
(Letter of December 13, 1974)

Additional data has been requested from the Bureau of Land Management and obtained. The information has been of value in responding to comments.

1. Comment: For the most part these transmission lines follow existing corridors in both the proposed action and alternatives (see Figure Nos. 3 and 55). However, these lines do diverge somewhat from the existing corridors especially in the Davis Dam area.

The impacts upon aesthetics of these departures as well as the attendant access roads are not discussed nor for that matter are the visual impacts of an additional line along side of the existing lines. Each additional line detracts from the general scenery of the area until all one sees is a maze of towers and wires. Impacts of this sort should be discussed.

Reply: The divergence of lines from existing old or new lines in some locations in Nevada and also in Arizona for short distances has been based on consultation with land management agencies such as the Bureau of Land Management or the Arizona State Land Department, for esthetic or economic reasons such as the divergence from existing lines in the area near Davis Dam and the Mohave Steam Plant. For a distance of about 2 miles south of Nevada State Highway 77 there may be need for a temporary construction access road or short spurs along the slope of Bridge Canyon. The aspect of an additional line alongside an existing line is in keeping with the policy expressed by Congress in P.L. 93-153 sections (p) and (s). In response to this Act, the Bureau of Land Management is preparing a report for Congress which will address the problems of multiple transmission lines. The visual impact of additional or incremental numbers of lines has been discussed in Section III.B.2.a. The maze of towers and wires effect is presently in existence in the Eldorado Valley between the McCullough Switching Station and the Mead Substation area and is illustrated in Figure Nos. 3, 8, 9, 16 and 17.

Environmental guidelines of the Western Systems Coordinating Council include as part of the criteria

"To minimize the environmental impact of a transmission line (c) add new lines parallel to existing lines provided that reliability criteria can be maintained." The additional impact of paralleling an existing system is covered by Chapter III.B.2.a. While the additional line can create additional visual impacts, the impact is less than with separated corridors. The statement points out in Chapter IV.C. that "the most obvious adverse impact associated with a transmission line is esthetic in nature." The impact is then minimized by paralleling other transmission lines. A transmission line system right-of-way includes the area for the attendant maintenance road. Parallel lines use only a common access road. Chapter I.D.3.d.(2) points out the nonparallel alinement routing in the area west of the Davis Dam Colorado River crossing.

SALT RIVER PROJECT
P.O. BOX 1980
PHOENIX, ARIZONA 85001

TELEPHONE 273-5900

December 18, 1974

Mr. E. A. Lundberg, Regional Director
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

re THE SALT RIVER PROJECT'S COMMENTS PERTAINING TO A DOCUMENT KNOWN AS THE GRANITE REEF AQUEDUCT TRANSMISSION SYSTEM DRAFT ENVIRONMENTAL STATEMENT

Dear Mr. Lundberg:

While the Salt River Project has no substantive comments regarding said document, we would like to express our appreciation for affording us the opportunity to review it. Thank you.

Respectfully,

A. Q. Colton, Supervisor
Environmental Division

ccg

Reply to Comment Made by
the Salt River Project
Phoenix, Arizona
(Letter of December 18, 1974)

No response to this letter is considered necessary.

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION-REGION ~~SEVEN~~ Nine

ARIZONA
CALIFORNIA
HAWAII
NEVADA

450 Golden Gate Avenue, Box 36096, San Francisco, Calif. 94102

December 19, 1974

IN REPLY REFER TO:
9ED

Mr. E. A. Lundberg
Regional Director
Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

We have reviewed the Draft Environmental Impact Statement (INT-DES-74-105) for the Granite Reef Aqueduct Transmission System, Central Arizona Project, and have no comments to offer.

We appreciate this opportunity to review the subject Draft EIS.

Sincerely yours,

For
F. E. Hawley
Regional Administrator

Reply to Comment Made by
the U.S. Department of Transportation
Federal Highway Administration--Region Nine
San Francisco, California
(Letter of December 19, 1974)

No reply to this letter is considered necessary.

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

DEC 1 1974

Mr. William F. Graham
Acting Assistant Commissioner
Bureau of Reclamation
U.S. Department of the Interior
Washington, D.C. 20240

Dear Mr. Graham:

Subject: FPC Comments - Draft Environmental Statement No. 74-105, Granite Reef Aqueduct Transmission System

This is in response to your letter of November 15, 1974, requesting comments on the Bureau of Reclamation's Draft Environmental Statement related to the approximately 275 miles of 230-kV transmission line from McCullough switchyard in Nevada to Liberty Substation in Arizona. In addition, 77 miles of 230-kV and 115-kV radial transmission lines will be constructed to service Havasu, Bouse Hills, Little Harquahala, and Hassayampa Pumping Plants along the Granite Reef Aqueduct.

In compliance with the National Environmental Policy Act of 1969 and the August 1, 1973, Guidelines of the Council on Environmental Quality, the Federal Power Commission's Bureau of Power staff comments on the need for a proposed electric power facility as it affects the adequacy and reliability of the affected bulk power system.

In preparing these comments, the Bureau of Power staff has considered the Bureau of Reclamation's Draft Environmental Statement and related reports submitted in accordance with the Commission's Statement of Reliability and Adequacy of Electric Service (Docket No. R-362). The staff bases its evaluation of the need for a bulk power facility upon long-term considerations as well as upon the load supply situation for the peak load period immediately following the availability of the new facility.

The subject electric transmission facilities, which are to be constructed over a 10-year period, are directly related to the development of the area water resources associated with the Granite Reef Aqueduct system. As such, specific local pumping loads will be served. The integration of the proposed 230-kV and 115-kV transmission line additions into the overlaid higher voltage bulk power network at at least two points gives reasonable assurance that said loads will receive adequate and reliable service.

The Bureau of Power staff concludes that the subject facilities are of the nature of those commonly provided by electric utilities to meet increased demands for electric energy.

Very truly yours,

T. A. Phillips
Chief, Bureau of Power

Reply to Comments Made by the Federal Power Commission Washington, D.C. (Letter of December 19, 1974)

No reply to this letter is considered necessary.

Do not type to the left of dotted line.

AZ–189

COVER SHEET for FEDERAL GRANT APPLICATION/AWARD NOTIFICATION

Related to 74-80-0009
73-80-0011

ARIZONA 74-60-0012
73-60-0041

1 APPLICATION DATE yr mo day 19 ___ ___ ___

ITEMS 1-31 TO BE COMPLETED BY APPLICANT OR CLEARINGHOUSE DEPENDING UPON STATE PROCEDURES

PART 1

3. APPLICANT – Organizational Unit: Bureau of Reclamation, Lower Colorado Regional Office
4. ADDRESS – Street or P. O. Box: P O Box 427
2 FEDERAL EMPLOYER ID NO.
5. CITY: Boulder City
6. COUNTY
7. STATE: NV
8. ZIP CODE: 89005
9. PROG NO./FEDERAL AGENCY

10. TYPE OF ACTION: a ☒ New c ☐ Modification b ☐ Continuation

TYPE OF CHANGE (Complete if 10b or 10c was checked)
11. a ☐ Increased Dollars b ☐ Decreased Dollars
12. a ☐ Increased Duration b ☐ Decreased Duration
13. a ☐ Other Scope Change b ☐ Cancellation
14a. EXISTING FED GRANT ID
14b. EXISTING CLEARINGHOUSE ID

15. REQUESTED FUND START yr mo 19___ ___
16. FUNDS DURATION ___(Months)
17. EST. PROJECT START yr mo 19___ ___
18. EST. PROJECT DURATION ___(Months)

19. APPLICANT TYPE Enter Letter: J

A. State F. School District
B. Interstate G. Community Action Agency
C. COG H. Sponsored Organization
D. County I. Indian
E. City J. Other

FUNDS REQUESTED (For Changes Show Only Amt. of Inc.(+) or Dec.(-).)

20a.	FEDERAL GRANT	( ) $	.00
20b.	FEDERAL LOAN	( ) $	.00
21.	STATE	( ) $	.00
22.	LOCAL	( ) $	.00
23.	OTHER	( ) $	.00
24.	TOTAL (20,21,22,23)	( ) $ 1	.00

25. BRIEF TITLE OF APPLICANT'S PROJECT: Granite Reef Aqueduct Transmission System - INT DES 74-105 - Draft Environmental Statement

26. PROJECT ABSTRACT (60 Characters Per Line – 5 Lines). Attach 1–2 Page Project Summary For Review.
Environmental impact associated with constructing an electric power transmission system to supply power to pumping plants and check structures along Granite Reef Aqueduct. About 333 miles of new transmission line will be constructed most of which will parallel existing lines.

27. AREA OF PROJECT IMPACT (Indicate City, County, State, etc.): Areawide, Maricopa, Yuma and Mohave Counties, Arizona

28. CONGRESSIONAL DISTRICT Of Applicant [ ] Districts Impacted By Project [001 002 003]
29. Environmental Assessment Required By State/Federal Agency? If Yes, Attach. ☒ Yes ☐ No
30. CLEARINGHOUSE(S) TO WHICH SUBMITTED a ☒ State b ☒ Area Wide

31. a NAME OF CONTACT PERSON: Mr. E. A. Lundberg, Regional Director
b ADDRESS – Street or P. O. Box: P O Box 427
c TELEPHONE NO.: 293-8560 Area Code 702

ITEMS 32-38 TO BE COMPLETED BY CLEARINGHOUSE

PART 2

32. CLEARINGHOUSE ID: 200 ☒ MULTIPLE CLEARINGHOUSE 201 204

33. a ACTION BASED ON REVIEW OF: a ☐ Notification b ☐ Application
33. b ACTION TAKEN: a ☒ With Comment b ☐ Without Comment c ☐ Waived d ☐ Unfavorable
34. STATE APPLICATION IDENTIFIER (SAI): AZ 74800072
State Number

35. CLEARINGHOUSE IMPACT CODE: STATE WIDE ☐ Yes ☒ No

County/ Plng Area	City	County/ Plng Area	City	County/ Plng Area	City	County/ Plng Area	City	County/ Plng Area	City	County/ Plng Area	City
013		015		027			Rec	12/23/74	URN		

36. STATE PLAN REQUIRED ☐ Yes ☒ No
37. RECEIVING DATE AT CLEARINGHOUSE 19 74 11 20
38. FINAL CLEARINGHOUSE ACTION DATE yr mo day 19 74 12 19 By Dennis A Davis
Dennis A. Davis
Exec. Sec'y for Federal Programs

ITEMS 39-42 TO BE COMPLETED BY APPLICANT BEFORE SENDING FORM TO FEDERAL AGENCY

PART 3

39. CERTIFICATION – The applicant certifies that to the best of his knowledge and belief the above data are true and correct and filing of this form has been duly authorized by the governing body of the applicant.
40. a NAME (Print or Type) b TITLE c SIGNATURE of Authorized Representative d TELEPHONE NUMBER
41. DATE MAILED TO FEDERAL/STATE AGENCY yr mo day 19___ ___ ___
42. NAME OF FEDERAL / STATE AGENCY TO WHICH THIS APPLICATION SUBMITTED

PART 4

43. GRANT APPLICATION ID (Assigned by Federal Agency)
44. GRANTOR AGENCY
45. ORGANIZATIONAL UNIT
46. ADMINISTERING OFFICE
47. ADDRESS – Street or P. O. Box
48. CITY
49. STATE
50. ZIP CODE
51. TELEPHONE NUMBER
52. Application Rec'd. yr mo day 19___ ___ ___
REVISIONS Amended Applic. Received yr mo day 19___ ___ ___ 19___ ___ ___ 19___ ___ ___
REVISIONS
54. Exp. Action Revised As Of yr mo day 19___ ___ ___ 19___ ___ ___ 19___ ___ ___
REVISIONS

PART 5

FINAL ACTION FINAL DATES yr mo day
55. a ☐ Awarded b ☐ Rejected c ☐ Withdrawn 19___ ___ ___
56. FUNDS AVAILABLE 19___ ___ ___
57. ENDING DATE 19___ ___ ___
58. FEDERAL GRANT ID
59. FEDERAL FUND ACCOUNT NUMBER

FUNDS APPROVED (For Changes Show Only Amt. of Inc. (+) or Dec. (-).)

60. FEDERAL AMOUNT (F Y___funds)	( ) $	.00
61. STATE SHARE	( ) $	.00
62. LOCAL SHARE	( ) $	.00
63. OTHER	( ) $	.00
64. TOTAL (60, 61, 62, 63)	( ) $	.00

65. MULTIPLE PROGRAM–LINK

PART 6

66. REMARKS

7/74

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

Office of Economic Planning
and Development, 3rd Floor
624 West Adams Street
Phoenix, Arizona 85007

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-80-007

Constance LaMonica

oject is referred to you for review and comment. Please evaluate as to:

the program's effect upon the plans and programs of your agency
the importance of its contribution to State and/or areawide goals and objectives
its accord with any applicable law, order or regulation with which you are familiar
additional considerations

return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further nation or additional time for review.

] No comment on this project
] Proposal is supported as written
] Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game & Fish
Civil Rights
Highways

Power
Health
Water
Land
Parks
AORCC
OEPAD

Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel & Energy
Bureau of Mines

Arid Lands Studi
Region I
Region IV

ments: (Use additional sheets if necessary)

ewer's Signature Harry Higgins

Plng. Dir.

Date 12-19-74

Telephone 271-5005

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

✓

Mr. John P. Dickinsón
Dept. of Economic Security
1717 West Jefferson Street
Phoenix, Arizona 85007

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-80-

om: Constance LaMonica

is project is referred to you for review and comment. Please evaluate as to:

(1) the program's effect upon the plans and programs of your agency
(2) the importance of its contribution to State and/or areawide goals and objectives
(3) its accord with any applicable law, order or regulation with which you are familiar
(4) additional considerations

ase return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need f
ormation or additional time for review.

☐ No comment on this project
☐ Proposal is supported as written
☒ Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game + Fish
Civil Rights
Highways
Power
Health
Water
Land
Parks
AORCC
OEPAD
Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel + Energy
Bureau of Mines
Arid Lan
Region
Region

omments: (Use additional sheets if necessary)

The proposal is supported with the proviso that all undetermined or unresolved Indian land claims and water rights are respected and that the proposal has the documented support of any Indian tribes whose land and/or water rights may be affected.

eviewer's Signature Juana P. Lyon Date 12-9-74

itle Indian Specialist Telephone 271-5129

✓

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

Mr. John Jett, Director
Mineral Resources Department
Fairgrounds, Mineral Building
1826 West McDowell Road
Phoenix, Arizona 85007

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-20-007

: Constance LaMonica

project is referred to you for review and comment. Please evaluate as to:

) the program's effect upon the plans and programs of your agency
) the importance of its contribution to State and/or areawide goals and objectives
) its accord with any applicable law, order or regulation with which you are familiar
) additional considerations

e return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further mation or additional time for review.

✓ No comment on this project
] Proposal is supported as written
] Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game + Fish
Civil Rights
Highways

Power
Health
Water
Land
Parks
AORCC
OEPAD

Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel + Energy
Bureau of Mines

Arid Lands Stu
Region I
Region IV

mments: (Use additional sheets if necessary)

iewer's Signature J Jett

Date 11-30-74

Telephone 258-6681

e Director

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

Mr. Clinton M. Pattea
Executive Secretary
Indian Affairs Commission
1645 West Jefferson St.
Phoenix, AZ 85007

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-80-

om: Constance LaMonica

is project is referred to you for review and comment. Please evaluate as to:

(1) the program's effect upon the plans and programs of your agency
(2) the importance of its contribution to State and/or areawide goals and objectives
(3) its accord with any applicable law, order or regulation with which you are familiar
(4) additional considerations

ase return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need fu
ormation or additional time for review.

☒ No comment on this project
☐ Proposal is supported as written
☐ Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game & Fish
Civil Rights
Highways

Power
Health
Water
Land
Parks
AO RCC
OEPAD

Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel & Energy
Bureau of Mines

Arid Lan
Region
Region

omments: (Use additional sheets if necessary)

viewer's Signature Clinton M Pattea Date 11-22-74

le Telephone

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

Mr. Robert Jantzen, Director
Game and Fish Department
Post Office Box 9095
Phoenix, AZ 85020

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-80-007

Constance LaMonica

oject is referred to you for review and comment. Please evaluate as to:

- the program's effect upon the plans and programs of your agency
- the importance of its contribution to State and/or areawide goals and objectives
- its accord with any applicable law, order or regulation with which you are familiar
- additional considerations

return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further ation or additional time for review.

No comment on this project
Proposal is supported as written
Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
✓ Game & Fish
Civil Rights
Highways

Power
Health
Water
Land
Parks
AORCC
OEPAD

Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel & Energy
Bureau of Mines

Arid Lands Studi
Region I
Region IV

nents: (Use additional sheets if necessary) Attached

wer's Signature Bruce R. Duke
Date 12/9/74

Biologist, Planning and Evaluation Branch
Telephone 942-3000

ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

December 12, 1974

Mr. E. A. Lundberg, Regional Director
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

We have again contacted our field biologists concerning the proposed Granite Reef Aqueduct Transmission System. The following comments pertain to your Draft Environmental Statement, dated November 14, 1974.

As you know, the Granite Wash and Harquahala mountain ranges both contain important populations of bighorn sheep that are already receiving excessive human pressure. The inevitable road that would accompany a new utility route through these mountains would create an additional means of access not tolerable to the sheep in these areas.

After reviewing your DES, however, it appears that the proposed 115-KV Harcuvar-Little Harquahala transmission line, as depicted in Figure 7 (pp. 12-13), would miss the main bighorn sheep areas. The line apparently would not cross the Granite Wash Mountains, the most important bighorn sheep habitat in this particular vicinity. In addition, Figures 30-31 (pp. 33-34) do not show the proposed line as crossing any important mountain masses. If these figures are accurate, we do not find any major conflict with the route selected for this proposed transmission line.

Our Department would like to reemphasize the existence of bighorn sheep in the Bighorn Mountains and the populations of desert mule deer and small game species on the desert floor surrounding them.

The opportunity to review and comment on this DES is appreciated. If we can be of further assistance, please notify us.

Sincerely,

Robert A. Jantzen, Director

By: Bruce R. Duke, Specialist
Planning and Evaluation Branch

BRD/cs
cc: Mrs. Constance LaMonica, Arizona State Clearinghouse ✓
Mr. Tony Putnam, Frank Lloyd Wright Foundation

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

√

Mr. Ford Smith, Exec. Dir.
Civil Rights Div, Dept of Law
1645 W. Jefferson, Room 140
Phoenix, Arizona 85007

State Application Identifier (SAI)
November 20, 1974
State AZ
Number 74-80-0

om: Constance LaMonica

is project is referred to you for review and comment. Please evaluate as to:

(1) the program's effect upon the plans and programs of your agency
(2) the importance of its contribution to State and/or areawide goals and objectives
(3) its accord with any applicable law, order or regulation with which you are familiar
(4) additional considerations

ease return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need furthe formation or additional time for review.

☐ No comment on this project
☒ Proposal is supported as written
☐ Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game + Fish
Civil Rights
Highways

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Health
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OEPAD

Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel + Energy
Bureau of Mines

Arid Lands S
Region I
Region IV

Comments: (Use additional sheets if necessary)

eviewer's Signature J. Ford Smith
Date November 25, 1974

itle Executive Director
Telephone (602) 271-5263

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

m. N. Price, State Hwy. Eng.
ronmental Planning Division
rtment of Highways
South 17th Avenue
nix, Arizona 85007

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-80-0072

nstance LaMonica

ect is referred to you for review and comment. Please evaluate as to:

e program's effect upon the plans and programs of your agency
e importance of its contribution to State and/or areawide goals and objectives
s accord with any applicable law, order or regulation with which you are familiar
dditional considerations

urn this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further on or additional time for review.

comment on this project
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Economic Sec
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Game & Fish
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Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel & Energy
Bureau of Mines

Arid Lands Studies
Region I
Region IV

nts: (Use additional sheets if necessary)

ee attached letter

r's Signature Mason J. Toles

Manager

Date December 5, 1974

Telephone 261-7767

ARIZONA DEPARTMENT OF TRANSPORTATION
206 South Seventeenth Avenue Phoenix, Arizona 85007

K WILLIAMS
Governor

HIGHWAYS DIVISION
WILLIAM A. ORDWAY
Director

December 5, 1974

Mr. E. A. Lundberg
Regional Director
Bureau of Reclamation
Lower Colorado Regional Office
Post office Box 427
Boulder City, Nevada 89005

Re: Granite Reef Aqueduct
Transmission System
INT DES 74-105
Draft Environmental Statement
State Application Identifier:
74-80-0072

Dear Mr. Lundberg:

The Environmental Planning Services of the Arizona Highways Division has reviewed the Granite Reef Aqueduct Transmission System INT DES 74-105 Draft Environmental Statement.

As is pointed out on page 43 of the study, the transmission lines will make several crossings over State and U.S. Highways. At these locations, no change in the use of roadways will be made except possibly for some unforeseen minor delays to the highway users during the time of the crossing construction. This certainly is a reasonable assessment and the impact upon the highways should not be significant.

We appreciate the opportunity to review and make comment on the Draft Environmental Statement.

Yours very truly,

WM. N. PRICE
State Engineer

Mason J. Toles

MASON J. TOLES, Manager
Environmental Planning Services

MJT:ADG:jh

Enclosure

cc: Constance LaMonica ✓

HIGHWAYS • AERONAUTICS • MOTOR VEHICLE • PUBLIC TRANSIT • ADMINISTRATIVE SERVICES • TRANSPORTATION PLANNING

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

Mr. Les Ormsby, Admin.
Arizona Power Authority
1810 West Adams Street
Phoenix, Arizona 85005

State Application Identifier (SAI)
November 20, 1974
State AZ
Number 74-80-0072

rc| Constance LaMonica

h project is referred to you for review and comment. Please evaluate as to:

) the program's effect upon the plans and programs of your agency
) the importance of its contribution to State and/or areawide goals and objectives
3) its accord with any applicable law, order or regulation with which you are familiar
4) additional considerations

se return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further rmation or additional time for review.

☒ No comment on this project
☐ Proposal is supported as written
☐ Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game & Fish
Civil Rights
Highways

Power
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Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel & Energy
Bureau of Mines

Arid Lands Studi
Region I
Region IV

mments: (Use additional sheets if necessary)

iewer's Signature L Ormsby

Date 12/3/74

Telephone

e

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

/

Dr. James L. Schamadan, Dir.
Department of Health Services
1740 West Adams Street
Phoenix, Arizona 85007

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-80-0C

om: Constance LaMonica

is project is referred to you for review and comment. Please evaluate as to:

(1) the program's effect upon the plans and programs of your agency
(2) the importance of its contribution to State and/or areawide goals and objectives
(3) its accord with any applicable law, order or regulation with which you are familiar
(4) additional considerations

ease return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need furthe formation or additional time for review.

☐ No comment on this project
☒ Proposal is supported as written
☐ Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game & Fish
Civil Rights
Highways

Power
Health
Water
Land
Parks
AO RCC
OEPAD

Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel & Energy
Bureau of Mines

Arid Lands S
Region I
Region IV

omments: (Use additional sheets if necessary)

eviewer's Signature James D. Goff P.E.
JAMES D. GOFF, P.E., ASSISTANT DIRECTOR
DIVISION OF ENVIRONMENTAL HEALTH SERVICES

Date 12-5-74

itle

Telephone

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

. Wesley E. Steiner, Eng.
te Water Commission
2 N. Central Ave., Suite 800
oenix, Arizona 85004

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-80-0072

Constance LaMonica

oject is referred to you for review and comment. Please evaluate as to:

the program's effect upon the plans and programs of your agency
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its accord with any applicable law, order or regulation with which you are familiar
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No comment on this project
Proposal is supported as written
with
Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game & Fish
Civil Rights
Highways

Power
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Land
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OEPAD

Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel & Energy
Bureau of Mines

Arid Lands Studies
Region I
Region IV

nents: (Use additional sheets if necessary)

The proposed project is an essential element of the Central Arizona Project, and, as described in the subject environmental impact statement, is supported by the Water Commission.

wer's Signature Bob Farrer

Staff Engr.

Date 12-11-74

Telephone 259-7561

o. Dr. James Schoenwetter
Center for Environmental Studie
Department of Anthropology
Arizona State University
Tempe, AZ 85281

✓

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-80-

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

(1) the program's effect upon the plans and programs of your agency
(2) the importance of its contribution to State and/or areawide goals and objectives
(3) its accord with any applicable law, order or regulation with which you are familiar
(4) additional considerations

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need fur information or additional time for review.

☒ No comment on this project
☐ Proposal is supported as written
☐ Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game & Fish
Civil Rights
Highways

Power
Health
Water
Land
Parks
AO RCC
OEPAD

Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel & Energy
Bureau of Mines

Arid Land
Region I
Region I

Comments: (Use additional sheets if necessary)

Reviewer's Signature James Schoenwetter
Date 10 Dec 74

Title Center for Env. Studies
Telephone

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

Ir Jick Myers
Fuel and Energy
1624 W Adams
Phoenix, AZ
85007

✓

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-80-0072

Constance LaMonica

roject is referred to you for review and comment. Please evaluate as to:

- the program's effect upon the plans and programs of your agency
- the importance of its contribution to State and/or areawide goals and objectives
- its accord with any applicable law, order or regulation with which you are familiar
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No comment on this project
Proposal is supported as written
Comments as indicated below

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Mineral Resources
Indian Affairs
Game + Fish
Civil Rights
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OEPAD

Environmental Studies
Az Historical Society
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Museum of Northern Az
Fuel + Energy
Bureau of Mines

Arid Lands Studies
Region I
Region IV

nents: (Use additional sheets if necessary)

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power line crosses four miles of State Park land near Parker and the orado River. Close study and planning should make the line as inobtrusive possible.

enty miles of new access roads will be constructed to service substations the power line. Although the Environmental Statement states that provisions l be made for slope and drainage, it does not show where the roads will be lt, nor indicate any alternate routes.

statement does say that vegetation will be destroyed and simply states that e access roads used for construction will be allowed to revegetate." (P. 134) ever, it seems that positive measures to re-seed and replant displaced trees cactus should be instigated to allow replacement of vegetative cover essenti

(continued on next page)

ver's Signature Jick Myers

Director

Date 12/2/74

Telephone 271-5001

to wildlife habitat and water runoff prevention. Merely to "allow" revegetation may, due to wind and water erosion, permanently damage delicate chaparral terrain.

The early completion of transmission lines is of vital importance to the economic well being of the State. We believe an excellent job has been done in preparing this statement in demonstrating that this is a satisfactory location for the proposed system.

FORM TO BE COMPLETED BY REVIEWING AGENCY

r. Donald C. Gilbert, Exec. Dir.
rizona Atomic Energy Commission
.601 West Jefferson Street
hoenix, AZ 85007

✓

State Application Identifier (SAI)
November 20, 1974
State AZ Number 74-80-0072

Fr Constance LaMonica

h roject is referred to you for review and comment. Please evaluate as to:

) the program's effect upon the plans and programs of your agency
) the importance of its contribution to State and/or areawide goals and objectives
) its accord with any applicable law, order or regulation with which you are familiar
) additional considerations

se return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further rmation or additional time for review.

☑ No comment on this project
☐ Proposal is supported as written
☐ Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game & Fish
Civil Rights
Highways

Power
Health
Water
Land
Parks
AORCC
OEPAD

Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel & Energy
Bureau of Mines

Arid Lands Studies
Region I
Region IV

mments: (Use additional sheets if necessary)

iewer's Signature Donald C. Gilbert

Date November 22, 1974

Executive Director

Telephone 271-4845

BALANCE OF FORM TO BE COMPLETED BY REVIEWING AGENCY

✓

Mr. William H. Dresher
Dean, College of Mines
Dir., Az. Bureau of Mines
The University of Arizona
Tucson, Arizona 85721

State Application Identifier (SAI)
November 20, 1974
State AZ
Number 74-80-0

rom: Constance LaMonica

NOV 27 1974

his project is referred to you for review and comment. Please evaluate as to:

(1) the program's effect upon the plans and programs of your agency
(2) the importance of its contribution to State and/or areawide goals and objectives
(3) its accord with any applicable law, order or regulation with which you are familiar
(4) additional considerations

lease return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need furthe formation or additional time for review.

☒ No comment on this project
☐ Proposal is supported as written
☐ Comments as indicated below

Economic Sec
Mineral Resources
Indian Affairs
Game + Fish
Civil Rights
Highways

Power
Health
Water
Land
Parks
AO RCC
OEPAD

Environmental Studies
Az Historical Society
Az Atomic Energy Comm.
Museum of Northern Az
Fuel + Energy
. Bureau of Mines

Arid Lands S
Region I
Region IV

Comments: (Use additional sheets if necessary)

Reviewer's Signature William H. Dresher

Date 12-4-74

Title Dean/Director

Telephone 884-1401

Robert Kennerly, Exec. Dir.
District IV COG
77 S. Main St., Rm. 202
Yuma, AZ 85364

State Application Identifier (SAI)

State AZ Number 74-80-002

or Constance LaMonica

is oject is referred to you for review and comment. Please evaluate as to:

the program's effect upon the plans and programs of your agency
the importance of its contribution to State and/or areawide goals and objectives
its accord with any applicable law, order or regulation with which you are familiar
additional considerations

return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further nation or additional time for review.

No comment on this project
☒ Proposal is supported as written
Comments as indicated below

☐ Respond to Applicant
☒ Respond to Clearinghouse

nments: (Use additional sheets if necessary)

iewer's Signature Brian H. Bakeman

Date 12-5-74

Dir. of Physical + Natural Resources

Telephone 782-1886

Reply to Comments Made
by Arizona State Clearinghouse
(Letter of December 19, 1974)

The State Clearinghouse circulated the draft environmental statement for review by numerous State agencies. The December 19, 1974, letter transmitted comments from 23 State agencies. Most agencies chose not to comment on the statement. The following table shows the different agencies reviewing the statement and how they chose to comment.

Responses Elicited by the Clearinghouse Process from Agencies in Arizona as Submitted by the Clearinghouse on December 19, 1974

	Agency	Date	Comment Code*				
			1	2	3	4	5
1.	Commission of Indian Affairs	11-22-74	X	-	-	-	-
2.	Arizona Atomic Energy Commission	11-22-74	X	-	-	-	-
3.	Civil Rights Div., Dept. of Law	11-25-74	-	X	-	-	-
4.	Mineral Resources Dept.	11-30-74	X	-	-	-	-
5.	Office of Fuel and Energy	12-02-74	-	-	X	-	-
6.	Arizona Power Authority	12-03-74	X	-	-	-	-
7.	Arizona Bureau of Mines	12-04-74	X	-	-	-	-
8.	Dept. of Health Services	12-05-74	-	X	-	-	-
9.	Dept. of Transportation	12-05-74	-	-	-	X	-
10.	District IV Council of Governments	12-05-74	-	X	-	-	-
11.	Dept. of Economic Security	12-09-74	-	-	X	-	-
12.	Game and Fish Dept.	12-09-74 & 12-12-74	-	-	X	-	-
13.	Center Environmental Studies Arizona State University	12-10-74	X	-	-	-	-
14.	Arizona Water Commission	12-11-74	-	X	-	X	-
15.	Office of Economic Planning and Development	12-19-74	X	-	-	-	-
16.	Arizona Water Commission	12-29-74	-	-	-	X	-
17.	Arizona State Land Dept.	12-31-74	-	-	X	-	-
18.	Arizona State Parks Dept. (State Historic Preservation Officer)		-	-	-	X	-
19.	Arizona Outdoor Recreation Coordinating Commission		-	-	-	-	X
20.	Museum of Northern Arizona		-	-	-	-	X
21.	Arizona Historical Society		-	-	-	-	X
22.	Arid Lands Studies, University of Ariz.		-	-	-	-	X
23.	Region I Council of Governments		-	-	-	-	X
Total Agencies Circulated - 23		Responses	7	4	4	4	5

*Comment Code:

1. No comment on this proposal
2. Proposal is supported as written
3. Comments to respond to
4. Comment but no response required
5. No comment form returned

The following replies only address letters received from those agencies that chose to comment.

1. Letter dated December 2, 1974, from Office of Fuel and Energy.

Comment: As the statement indicates, the right of way for the transmission line will parallel already existing power lines. The distance from the already existing lines is not indicated, and it may be helpful to know what already created inspection roads may be used.

Reply: The distance from existing transmission lines will vary depending on the voltage levels and the existing right-of-way widths. Normally, where lines are parallel to existing lines the new right-of-way will be directly adjacent to existing rights-of-way utilizing a common boundary line. The right-of-way widths will be as described in Chapter I.E.1. and as indicated by Table No. 4. The extent to which existing inspection roads will be used can only be determined during and after construction.

Comment: The power line crosses four miles of State Park land near Parker and the Colorado River. Close study and planning should make the line as inobstrusive as possible.

Reply: The line will parallel an existing line where it crosses state park land. Tower locations will be made to be as unobstrusive as possible while maintaining a parallel route to the existing line in sensitive areas such as the Lake Havasu State Park area.

Comment: Seventy miles of new access roads will be constructed to service substations and the power line. Although the Environmental Statement states that provisions will be made for slope and drainage, it does not show where the roads will be built, nor indicate any alternate routes.

Reply: The roads will be built on the new line right-of-way. In some instances the roads may have to deviate from the line right-of-way because of terrain features. Location of these few deviations will be done by the contractor with the approval of the Bureau of Reclamation. After these roads that are off the right-of-way have served their useful purpose they will be scarified or obliterated as necessary to induce natural revegetation. The one mile of access road to Harcuvar has not been located at this time but in all probability it will utilize existing access roads as much as possible.

Comment: The statement does say that vegetation will be destroyed and simply states that "the access roads used for construction will be allowed to revegetate." (P. 134.) However, it seems that positive measures to re-seed and replant displaced trees and cactus should be instigated to allow replacement of vegetative cover essential to wildlife habitat and water runoff prevention. Merely to "allow" revegetation may, due to wind and water erosion, permanently damage delicate chaparrel terrain.

Reply: Vegetation will be destroyed in the direct path of the new access and construction roads. Those roads not used for maintenance will be scarified and obliterated where necessary to induce natural revegetation. It would not be practical to replant cacti, desert shrubs, and grasses in the roads that may be used later for maintenance. Rainfall generally is too low to justify artificial reseeding in the area which the transmission lines traverse. Natural revegetation should take place in years of higher-than-average rainfall, but in no desert situation does it ever reach such a climax stage of cover for water runoff prevention. Chaparrel vegetative communities are not found along the system alinements.

2. Letter dated December 9, 1974, from the Department of Economic Security.

Comment: The proposal is supported with the proviso that all undetermined or unresolved Indian land claims and water rights are respected and that the proposal has the documented support of any Indian Tribes whose land and/or water rights may be affected.

Reply: The rights and claims of all citizens, Indian and non-Indian, will be respected under due process of law in any action concerning this project.

3. Letters dated December 9, 1974, and December 12, 1974, from the Arizona Game and Fish Department.

The December 9 letter merely transmitted a second copy of the December 12 letter. The December 12 letter has been responded to elsewhere in this appendix.

4. Letter dated December 31, 1974, from the Arizona State Land Department.

This letter is responded to elsewhere in this appendix.

NEW MEXICO INTERSTATE STREAM COMMISSION
BATAAN MEMORIAL BUILDING
STATE CAPITOL
SANTA FE, NEW MEXICO 87501

COMMISSIONERS

HILTON A. DICKSON, JR., Chairman, Silver City
S. E. REYNOLDS, Secretary, Santa Fe
J. P. WHITE, JR., Roswell
DRAPER BRANTLEY, Carlsbad
ALVIN M. STOCKTON, Raton
WALTER BAMERT, Las Cruces
EDWARD J. APODACA, Albuquerque
RICHARD P. COOK, Espanola
JOHN A. DEAN, Farmington

LEGAL ADVISERS

CLAUD S. MANN, Albuquerque
CHARLES M. TANSEY, Farmington

December 20, 1974

Mr. E. A. Lundberg
Regional Director
Lower Colorado Regional Office
Bureau of Reclamation
P. O. Box 127
Boulder City, Nevada 89005

Dear Ed:

This is in response to your November 15, 1974 transmittal of the draft environmental statement for the Granite Reef Aqueduct Transmission System, a feature of the Central Arizona Project. We have no specific comments to offer on the environmental statement and we continue to support all features of the Central Arizona Project.

We appreciate the opportunity to review and comment on this environmental statement.

Sincerely,

Steve

S. E. Reynolds
Secretary

SER:re

Reply to Comment Made by the New Mexico Interstate Stream Commission Santa Fe, New Mexico (Letter dated December 20, 1974)

No reply to this letter is considered necessary.

MIKE O'CALLAGHAN
Governor

NEVADA
STATE
PARK
SYSTEM

ERIC R. CRONKHITE
Administrator

ROOM 221
NYE BUILDING
201 S. FALL STREET
CARSON CITY
NEVADA 89701
702/882-7339

702/885-4370

December 23, 1974

Mr. E. A. Lundberg, Regional Director
U. S. Department of the Interior
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

We have reviewed the draft environmental statement on the Granite Wreath Aqueduct Project dated November 14, 1974.

In the course of this review, we contacted Dr. Richard H. Brooks, Director of the southern division of the Nevada Archeological Survey, to determine if that agency concurred with the statements made relative to the archeological and historical resources in the draft environmental statement. A copy of Dr. Brooks' reply is enclosed for your reference.

The survey conducted by the Nevada Archeological Survey should be correctly identified as a preliminary spot check to assess the archeological and historical site potential and not as a "detailed archeological survey" as now represented in the draft.

The reference to none of the located archeological or historical sites being of a quality for placement on the National Register of Historic Places should be deleted or revised to inform the reader that data are insufficient to make such a determination.

The data presented in the draft statement are not sufficient to properly determine the impacts of the project upon the archeological and historic resources. We recommend that provisions be made to include a complete survey as suggested by Dr. Brooks before the alignment is finalized so that proper mitigation measures may be formulated and carried out prior to construction.

a division of the Department of Conservation and Natural Resource
Elmo J. DeRicco, Directo

December 23, 1974
Mr. E. A. Lundberg
Page 2

We appreciate the opportunity to review this proposal. Please feel free to contact us if you need further information.

Sincerely,

Eric Cronkhite

Eric R. Cronkhite, Administrator
(State Historic Preservation Officer)

ERC:lk

UNIVERSITY OF NEVADA, LAS VEGAS

Museum of Natural History

4624 Maryland Parkway South
Las Vegas, Nevada 89109
Phone: (702) 739-3381

December 13, 1974

Eric R. Cronkhite
State Historic Preservation Officer
Nevada State Park System
201 S. Fall Street
Carson City, Nevada 89701

Attention: Marshall Humphreys, Interpretive Specialist

Dear Mr. Cronkhite:

As Director of the Southern Division of the Nevada Archaeological Survey, I was in direct charge of this transmission line survey and George Bondley worked under my supervision. I do not agree with the evaluations of that survey as they are presented in the environmental statement. In the process of supervising Mr. Bondley's work at the end of the survey, I re-checked with Mr. Bondley the major site areas and submitted my recommendations to the National Park Service in the conclusions of the official report. Furthermore, as delineated in the purchase order received from the National Park Service for the Bureau of Reclamation, this was a preliminary spot check to assess the archaeological and historical site potential for this transmission line right-of-way. In fact, in my recommendation to the Park Service, I submitted a budget for completion of the survey and mitigation of the sites encountered.

The statements in the impact section are misleading as no assessment was made as to whether any of the sites located are of national register quality, and further survey had been recommended. On page 147, reference to a detailed archaeological survey is eroneous, since this had been only a preliminary survey as stated above.

I suggest you contact the National Park Service, Tucson Archaeological Center, for copies of my recommendation and budget proposal to complete the survey, and their follow-up report to the Bureau of Reclamation.

The conclusions of this Draft Environmental Statement with regard to archaeological sites in the Nevada portion of the transmission line right-of-way are not acceptable to me and in no way relate to the brief preliminary survey conducted by one man over a 10-day period.

Sincerely yours,

Richard H Brooks

Richard H. Brooks, Director
Southern Division
Nevada Archaeological Survey

RECEIVED
16 1974
NEVADA STATE
PARK SYSTEM

RHB:sbg

Reply to Comments Made by
the Nevada State Historic Preservation Officer
Nevada State Park System
Carson City, Nevada
(Letter dated December 23, 1974)

1. Comment: The survey conducted by the Nevada Archeological Survey should be correctly identified as a preliminary spot check to assess the archeological and historical site potential and not as a "detailed archeological survey" as now represented in the draft.

The reference to none of the located archeological or historical sites being of a quality for placement on the National Register of Historic Places should be deleted or revised to inform the reader that data are insufficient to make such a determination.

Reply: The surveys performed by the Nevada Archeological Survey were intended to be inventory surveys and are identified as such in the draft statement. Section II.L. has been expanded to show the depth of the survey performed.

2. Comment: The data presented in the draft statement are not sufficient to properly determine the impacts of the project upon the archeological and historic resources. We recommend that provisions be made to include a complete survey as suggested by Dr. Brooks before the alignment is finalized so that proper mitigation measures may be formulated and carried out prior to construction.

Reply: Sections II.L., III.B.2.c., IV.C.3., VI., and Appendix C. Table 7, have been reviewed. Where appropriate, direct quotations from the archeological survey reports by the University of Nevada, Las Vegas, and Arizona State University (References Cited Nos. 115, 131, and 145) for the transmission system have been added. The minor mitigation work for specific sites has been additionally identified and added to Appendix C, Table 7. The Arizona Archeological Center, National Park Service, has been consulted to determine the adequacy of the University of Nevada, Las Vegas, report in meeting contractual adequacy for objectives, information, and recommendations. The comments of the National Park Service have been coordinated and integrated into any revisions made and to replies to this comment letter and to the National Park Service. Action has been initiated to obtain archeological clearance by the National Park Service prior to construction of the proposed facilities. As discussed in Chapter IV those sites that have been identified will continue to be evaluated under the guidelines of the Advisory Council on Historic Preservation (36 CFR 800) and, when appropriate, procedures for compliance with Section 106 of the National Historic Preservation Act followed. Construction of the transmission system is estimated to take 10 years to complete. As many of the alternatives described in the statement are still under active consideration, Reclamation believes it is prudent to schedule these compliance procedures to be consistent with the construction schedule. If, after consultation with the appropriate State Historic Preservation Office, it is felt that additional study is needed, then it will be performed.

United States Department of the Interior

NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

DEC 23 1974

L7619
(WR)PSE

Memorandum

To: Commissioner, Bureau of Reclamation

Through: Assistant Secretary for Fish and Wildlife and Parks

From: Acting Associate Director, Park System Management

Subject: Review of draft environmental statement for Granite Reef Aqueduct Transmission System, Central Arizona Project, Arizona - New Mexico (DES-74/105)

We have reviewed the draft environmental statement and offer the following comments for your consideration.

COMMENTS ON THE PROPOSAL

The proposed action will affect Lake Mead National Recreation Area but should not affect any existing, proposed, or known potential sites or properties listed or to be listed as National Landmarks.

COMMENTS ON THE ENVIRONMENTAL STATEMENT

The statement erroneously refers to the transmission line passing through proposed wilderness areas. The line does not pass through any such wilderness within Lake Mead National Recreation Area, and the statements on pages 26, 85, and 125 should be changed to reflect this. We feel that the proposed action is better than alternative 1(c) on page 191 because of the extensive impact of the alternative proposal (24 miles of line) in the Lake Mead National Recreation Area.

We feel the statement fails to provide substantial information concerning the impact of the project on archeological and historical resources, and offer the following specific comments.

JOHNNY HORIZON '76
Let's Clean Up America For Our 200th Birthday

P. 92. After careful reexamination of the survey report, "An Archeological Survey of the Mead-Davis-Parker 230 kv Transmission Line #2," by George A. Bondley, it appears that a number of the sites located by the survey are of the quality for placement on the National Register of Historic Places. Using the criteria for National Register set forth in Title 36 CFR 800.10, all of the sites should be reevaluated for their National Register potential.

After examining the site survey records included with Bondley's report, and without the benefit of a field examination, it appears that the following sites may possess National Register potential:

1. The Oatman Sites #1 through #9 taken as a single unit;
2. The Metropolitan Water District Sites #1 through #4 and the Searchlight and Mead-Davis Site #1 taken as a single unit;
3. The Searchlight Mining District Sites #1 through #3 taken as a single unit.

The historical significance of the Searchlight Mining District should be evaluated from a historical framework, as distinct from archeological significance.

In addition, the statement made on this page that the researchers believe these sites will add little or no new information to the study of archeology of the area is inaccurate. On pages 10-11 of his report, Bondley states that "the Metropolitan Water District site series and Searchlight-Mead-Davis Site #1 will expand archeological knowledge of site settlement patterns in this area of southern Nevada."

P. 116. The statement that none of the sites are considered by the investigating archeologists to be of National Register quality is not completely accurate. Although Alfred E. Dittert made a statement to this effect concerning the sites which were identified by the Arizona State University survey, Bondley never mentioned or discussed the National Register quality of any of the sites identified by the Nevada Archeological Survey.

Although Chapter IV, Mitigation and Enhancement Measures, discusses the mitigative measures which will be taken if archeological and/or historic resources are uncovered that were not found during the detailed archeological survey, it fails to mention or discuss what mitigative measures will be taken prior to construction. Bondley recommends various mitigative measures, which should be undertaken prior to construction, for a number of the sites located within the transmission line right-of-way. The final statement should contain a discussion of the mitigation measures which will be undertaken prior to construction.

P. 44. The construction of approximately 70 miles of new access roads could have adverse effects upon archeological and historic resources. If the routes of these roads have been surveyed by a professional archeologist, this should be documented in the final statement. If the routes have not been so surveyed, they should be as soon as possible. The archeologist's findings and recommendations should be included in the final statement and all significant resources should be described and evaluated for their National Register potential. Copies of any archeological reports obtained should be made available to the National Park Service, Arizona Archeological Center, P.O. Box 49008, Tucson, Arizona, 85717, in accordance with section 3(a) of Public Law 93-291.

P. 105-106. In selecting the location of the small borrow areas within the transmission line right-of-way, the presence of cultural resources should be considered. Such borrow areas should be located where they will have no effect upon such resources.

We are pleased that in the event further consideration is given to the selection of any of the alternate transmission line routes discussed in the draft statement, that an archeological survey will be made along the alignment and that clearance will be obtained prior to construction.

Replies to Comments Made by the
National Park Service
Washington, D.C.
(Memorandum dated December 23, 1974)

1. Comment: The proposed action will affect Lake Mead National Recreation Area but should not affect any existing, proposed, or known potential sites or properties listed or to be listed as National Landmarks.

Reply: The effect of the preferred alinement and alternative alinements has been presented throughout the statement.

2. Comment: The statement erroneously refers to the transmission line passing through proposed wilderness areas. The line does not pass through any such wilderness within Lake Mead National Recreation Area, and the statements on pages 26, 85, and 125 should be changed to reflect this. We feel that the proposed action is better than alternative 1(c) on page 191 because of the extensive impact of the alternative proposal (24 miles of line) in the Lake Mead National Recreation Area.

Reply: The referenced sections in I.D.3.d.(2), II.J.3.b., and II.C.2.a.(4) have been edited to reflect the transmission line corridors which have been included within or adjacent to specific proposed wilderness subareas. The descriptor "extensive" is believed to be an overstatement for the incremental construction of one line parallel and adjacent to an existing line and which would be in keeping with national policy to parallel existing lines.

3. Comment: P. 92. After careful reexamination of the survey report, "An Archeological Survey of the Mead-Davis-Parker 230-kV Transmission Line No. 2," by George A. Bondley, it appears that a number of the sites located by the survey are of the quality for placement on the National Register of Historic Places. Using the criteria for National Register set forth in Title 36 CFR 800.10, all of the sites should be reevaluated for their National Register potential.

Reply: Section II.L has been expanded with documentation from the reports of 1973 field surveys accepted by the National Park Service as fulfilling the contractual terms for providing adequate information for environmental statement preparation by Reclamation. The 36 CFR 800.10 criteria referred to were published in the Federal Register on February 19, 1974. Action has been initiated to evaluate the sites in accordance with criteria of the Advisory Council on Historic Preservation.

4. Comment: After examining the site survey records included with Bondley's report, and without the benefit of a field examination, it appears that the following sites may possess National Register potential:

1. The Oatman Sites #1 through #9 taken as a single unit;

2. The Metropolitan Water District Sites #1 through #4 and the Searchlight and Mead-Davis Site #1 taken as a single unit;
3. The Searchlight Mining District Sites #1 through #3 taken as a single unit.

Reply: Reference is made to the action discussed in the preceeding comment and reply. The reports indicate that a total of 33 sites were located. The difference between all sites from the previous comment and the 17 enumerated sites on this comment indicates that NPS has reevaluated 16 sites as being deficient in potential. The evaluation team for the Searchlight Mining District sites should include a geologist and a mining engineer on the panel to provide professional expertise appropriate to the primary occurrence and significance of this unit. Reference should also be made to the Bureau of Land Management's report on the Stateline Planning Unit.

5. Comment: The historical significance of the Searchlight Mining District should be evaluated from a historical framework, as distinct from archeological significance.

Reply: Reference should be made to the two preceeding comments and replies. Bulletin 62 of the Nevada Bureau of Mines in 1965 indicates that this district produced ore in 1962 and current information indicates that there is still limited production in 1975.

6. Comment: In addition, the statement made on this page that the researchers believe these sites will add little or no new information to the study of archeology of the area is inaccurate. On pages 10-11 of his report, Bondley states that "the Metropolitan Water District site series and Searchlight-Mead-Davis Site #1 will expand archeological knowledge of site settlement patterns in this area of southern Nevada."

Reply: Sections II.L. and III.B.2.c. have been revised.

7. Comment: P. 116. The statement that none of the sites are considered by the investigating archeologists to be of National Register quality is not completely accurate. Although Alfred E. Dittert made a statement to this effect concerning the sites which were identified by the Arizona State University survey, Bondley never mentioned or discussed the National Register quality of any of the sites identified by the Nevada Archeological Survey.

Reply: Section III.B.2.c. has been revised on the basis of supplemental information from NPS indicating that the Bondley (UNLV) report work order did not include the same requirement for evaluation as in the ASU report. The absence of a comment on quality in the UNLV report was interpreted on the basis that the report accepted by NPS was prepared to the same standards and requirements as the ASU report by Dittert. Recently supplied information indicates that the work order for UNLV did not contain a quality requirement. Evaluation of the sites found will be made prior to construction of adjacent transmission lines.

8. Comment: Although Chapter IV, Mitigation and Enhancement Measures, discusses the mitigative measures which will be taken if archeological and/or historic resources are uncovered that were not found during the detailed archeological survey, it fails to mention or discuss what mitigative measures will be taken prior to construction. Bondley recommends various mitigative measures, which should be undertaken prior to construction, for a number of the sites located within the transmission line right-of-way. The final statement should contain a discussion of the mitigation measures which will be undertaken prior to construction.

Reply: In January 1975, actions were initiated to obtain archeological clearance of the transmission system alinement through the measures recommended and shown on Table C-7 for evaluative procedures and studies. The first line segment to be cleared will be for the Davis-Parker No. 2 alinement as modified and reported in this final statement, including field survey of alinement changes. Chapter IV of this statement identifies procedures Reclamation will follow in complying with the guidelines of the Advisory Council on Historic Preservation.

9. Comment: P. 44. The construction of approximately 70 miles of new access roads could have adverse effects upon archeological and historic resources. If the routes of these roads have been surveyed by a professional archeologist, this should be documented in the final statement. If the routes have not been so surveyed, they should be as soon as possible. The archeologist's findings and recommendations should be included in the final statement and all significant resources should be described and evaluated for their National Register potential. Copies of any archeological reports obtained should be made available to the National Park Service, Arizona Archeological Center, P. O. Box 49008, Tucson, Arizona, 85717, in accordance with section 3 (a) of Public Law 93-291.

Reply: Section II.L. as revised indicates the extent of the 70 miles of new access roads particularly for the Harcuvar-Little Harquahala and Harcuvar-Bouse Hills 115-kV lines that were field surveyed either from slow moving vehicle or on foot. The archeological reports supporting this statement were obtained by fund transfer from the Bureau of Reclamation to the National Park Service for services rendered by the Arizona Archeological Center in contracting with Arizona State University and University of Nevada, Las Vegas for the surveys and reports. The reports were accepted by National Park Service as fulfilling the conditions of the work orders issued and copies were retained in the Arizona Archeological Center files at the time the copies were transmitted to Reclamation. If future contractual arrangements require that Reclamation contract for professional archeological services outside of usual coordinating and cooperative procedures through the Arizona Archeological Center, Reclamation staff archeologists will prepare work order specifications and review work as accomplished and when being reported. Upon completion of such work by Reclamation under section 7(a) of P.L. 93-291, copies will be provided to the Arizona Archeological Center of the National Park Service, and to the State Historic Preservation Officer. The copy to the National Park Service will be construed as advising the Secretary of the Interior under Section 3(a) of P.L. 93-291 in accord with the interpretation given in the comment. Copies of reports retained by the Arizona Archeological Center in performance of cooperatively arranged studies will also be construed as fulfilling Section 3(a) notification and where funds are transferred from Reclamation these funds will be construed as Section 7(a) work.

10. Comment: P. 105-106. In selecting the location of the small borrow areas within the transmission line right-of-way, the presence of cultural resources should be considered. Such borrow areas should be located where they will have no effect upon such resources.

Reply: All such areas will be examined by appropriate professionals as a matter of Reclamation policy. Should any cultural resources be located, standard procedures of evaluation nomination, and compliance with the requirements of 36 CFR 800 would be accomplished in the unlikely event alternative borrow areas were not located within a feasible hauling distance.

BLM Library
Denver Federal Center
Bldg. 85, OC-521
P.O. Box 25047
Denver, CO 80225

STATE OF NEVADA
OFFICE OF THE STATE PLANNING COORDINATOR
CAPITOL COMPLEX
CARSON CITY, NEVADA 89701
(702) 885-4865

December 24, 1974

Mr. E. A. Lundberg
Lower Colorado Regional Office
P.O. Box 427
Boulder City, Nevada 89005

RE: GRANITE REEF ACQUEDUCT TRANSMISSION SYSTEM
SAI # NV 75800010

Dear Mr. Lundberg:

Attached are comments from state agencies which are affected by the above referenced Environmental Impact Statement.

These comments constitute the State Clearinghouse review of this proposal, and we would appreciate it if you would incorporate them in the final Environmental Impact Statement.

Sincerely yours,

Bruce D. Arkell

Bruce D. Arkell
State Planning Coordinator

BDA:bw
Attachments
CC: Mr. Paff

STATE OF NEVADA
DIVISION OF
COLORADO RIVER RESOURCES
P.O. Box 1748
LAS VEGAS, NEVADA 89101
TELEPHONE (702) 739-8480

MIKE O'CALLAGHAN
GOVERNOR

DONALD L. PAFF
ADMINISTRATOR

December 18, 1974

Memorandum

To: Bruce Arkell, State Planning Coordinator

From: Administrator, Division of Colorado River Resources

Subject: Draft Environmental Impact Statement-Central Arizona Project-Granite Reef Aqueduct Transmission Line.

The attached comments have been made in accordance with previous discussions with the Eldorado Valley Advisory Group which at that time did not have the draft statement to consider. It is intended that the Advisory Group will discuss the statement at its next meeting scheduled for January 6, 1975. Our comments, which are attached, are limited to the impacts of the proposed transmission system on the Eldorado Valley Development Area as set forth in Public Law 85-339 and Nevada Revised Statutes 321.400 through 321.450.

We have broken down our comments in three categories as follows:

Attachment I - General Comments

Attachment II - Detailed Report Comments, Corrections and Observations

Attachment III - Supplemental

We have also enclosed copies of the following letters:

Letter to Mr. Donald L. Paff, Division of Colorado River Resources from Mr. E. A. Lundberg, U. S. Bureau of Reclamation dated June 21, 1974

Letter to Mr. E. A. Lundberg, U. S. Bureau of Reclamation from Mr. Donald L. Paff, Division of Colorado River Resources dated September 30, 1974.

The U. S. Bureau of Reclamation is to be highly commended for accomplishing this extremely difficult statement which, on the whole, has been well executed.

Donald L. Paff

Donald L. Paff
Administrator

Enclosures

cc w/enclosures: Mr. Elmo J. DeRicco
Director
Department of Conservation and
Natural Resources
Nye Building
201 South Fall Street
Carson City, Nevada 89701

Attachment I

Draft Environmental Impact Statement - Granite Reef Aqueduct Transmission System

General Comments

A. The impact of that 21.8 mile portion of the McCullough-Mead-Davis line crossing the Eldorado Valley in Southern Nevada is not clearly or fully identified. The Statement does not reflect future potential of the Eldorado Valley development nor the land use restrictions imposed by the actual right-of-way or adjacent areas.

B. The Eldorado Valley Advisory Group (Nevada Revised Statutes 321.430 and 321.440) has indicated its preference of routes as "Alternative 3" (Route running north from the McCullough Switching Station paralleling the Navajo-McCullough 500 KV line to the intersection of the proposed Oregon Border-Mead 750 KV d.c. line, thence running east paralleling the route of the proposed Oregon Border-Mead line to the Mead Substation). The draft Statement does not, in our opinion, present any information that modifies that preference. In addition, should the potential of an airport in the Eldorado Valley be realized even this preferenced route would present economic and environmental problems.

Attachment II

Draft Environmental Impact Statement - Granite Reef Aqueduct Transmission System

Detailed Report Comments, Corrections and Observations

A. Figure 3, following page 12: Since the following text refers to P.L. 85-339 lands under option to the State of Nevada, we would suggest that the boundary of these optioned lands be designated in Figure 3 and all other figures following which show the Nevada section of the transmission line.

B. Page 38, last paragraph, first sentence: The State of Nevada in its P.L. 85-339 land option has established a precedence in reserving the right to impose relocation conditions on easements where they have been contradictory to planning objectives such as a future major air-carrier airport. The acquisition of rights-of-way in the form of "a perpetual easement" is therefore open to modification within the Eldorado Valley Development Area. (See General Comments)

C. Page 40 and 41, under heading Land use: Since there is apparently no present valid right pertaining to the additional right-of-way required as conditioned in Sec. 5 of P.L. 85-339, it is our belief that the State has an authority in the determination of rights-of-way routes which may be selected, pursuant to Sec. 2 of the act which directs the Secretary to segregate the optioned lands from all forms of entry, since the State has filed for transfer and Section 7 of the Act is in effect. The plan of development referred to in the first full paragraph should also refer to planning documents of the Clark County Director of Aviation as listed in items C and D of Attachment III.

D. Page 47, second full paragraph: We would suggest more specific benefactors in the mutual interrelationship of the integrated CAP System, such as customers of U. S. Parker-Davis, Hoover, and CRSP hydropower.

E. On page 50, first full paragraph, first line: insert "surface" between no and drainage.

F. Page 73, last sentence: add "potable" between for and ground, since some test wells have resulted in limited amounts of relatively high saline water.

G. Page 78, third paragraph: The annex and/or bibliography should include the provisions of P.L. 85-339 for completeness.

H. Figure 47 - See Item A: Lands reserved for State of Nevada under P.L. 85-339 are not clearly identifiable and cross-hatching the entire withdrawn area would be a better method of presentation.

I. Page 85, second full paragraph: We are led to believe that BLM planning within the P.L. 85-339 Eldorado Valley Development Area is not to be carried out pending specific State land use planning proposals.

J. Page 88-89: The two paragraphs do not adequately depict the status of Nevada planning under P.L. 85-339 as it exists today. The State, through the Division of Colorado River Resources, has applied for the land under option to the Secretary of the Interior and is awaiting the acceptance of the application and acceptance of the preliminary General Plan amendments of 1969. The State goal as published by the State Planning Coordinator in 1974 is of particular interest in regard to planning and the intent of the State in carrying through its option.

K. Page 95, first paragraph: The State has clearly identified its position in past land sales agreements, and in previous powerline environmental statement comments, that Nevada industries, services, and labor be utilized wherever possible for projects within the State, and this should be recognized wherever this subject is brought up.

L. Page 102, first three paragraphs: This section of the statement "Impacts on Man" for the Nevada transmission line segment has been overly brief and simplified, since Item K (above), future land use, and other impacts have not been adequately dealt with in light of the before referenced Nevada State Goals, the Landrum & Brown "Clark County Airport System Plan", and DCRR "Policies for Development of the Eldorado Valley" (Appendix A-50).

M. Page 118, first paragraph: In spite of the statement represented in this paragraph, it is obvious that present land use is not the important criteria, but future land use is an essential consideration in this area which is immediately adjacent to one of the fastest growing portions of the nation.

N. Page 119, second paragraph: Electrical interference would be a major problem contribution by the transmission line in proximity to the Eldorado Valley Development Area now under consideration for a major air-carrier airport. This interference would [illegible] navigation and other instrument [illegible]

O. Page 121, second paragraph: refer to Attachment I as they apply to availability of excess generating and transmission capacity.

P. Page 123, first full paragraph: See Item M, above.

Q. Page 125, first full paragraph: The future use of P.L. 85-339 lands are now restricted by present transmission lines which regrettably may have to be relocated in the future. The economic impact of another new line parallelling the present lines would certainly represent an adverse impact to the State of Nevada and future development of the Eldorado Valley.

R. Page 126, first paragraph: This paragraph should also reflect the hazard of aircraft approach and landing patterns in the proposed Eldorado Valley airport.

S. Page 132, Summary Paragraph: Mention should be cited of the consumptive use of the resource land in the Eldorado Valley Development Area which is precluded from being put into the use planned for it unless the McCullough-Mead-Davis alinement is changed.

T. Page 133, fourth and fifth paragraphs: refer again to Item K concerning use of Nevada labor, services, and industries in this construction project.

U. Page 137, second full paragraph: Again, present land use should be deemphasized and future land use should be more forcefully and completely addressed.

V. Page 150, first full paragraph: There will also be restrictions to future land use on a large portion of the 105,000 acres of the Eldorado Valley, since airport consultants have stressed that a major, full-scale air-carrier operation can be oriented in only one particular orientation within the Valley. This also applies to and negates the discussion on page 153, last six lines.

W. Page 159 to page 204 should be written to take into account additional alternatives which reroute the McCullough-Mead-Davis lines within the Eldorado Valley. Reference is particularly directed to Mr. E. Al Lundberg's letter of June 21, 1974, to Mr. D. L. Paff-CRC, and alternate route 3 which was recommended by a special subcommittee of the Eldorado Valley Advisory Group as stated in Mr. Paff's letter of September 30, 1974.

Figure 55 should be revised to show the several alternatives presented in the USBR June 21 letter, and the outline of P.L. 85-339 lands should also be more clearly marked.

X. Page 189, last sentence of first partial paragraph: This statement is utterly false and misleading when viewed in context of the Eldorado Valley Development Plan for a county air-carrier facility.

We would affirm paragraph 2 on page 189 and add some degree of emphasis to the last line of the last paragraph. The economics of relocation in ten years may far overshadow the cost of 6 to 8 additional miles of line in the initial construction stage. We feel this alternative should be included in figure 55.

Y. Page 206: We note that the Nevada Power Company proposed Allen Project is not included in this table.

Attachment III

Draft Environmental Impact Statement - Granite Reef Aqueduct Transmission System

Supplemental References

A. Nevada State Goals dated March 1, 1974, Office of Governor-State Planning Coordinator - Pages 1-2, & 1-3/

B. P.L. 85-339, Eldorado Valley Act.

C. Clark County Airport System Plan, Summary Report Landrum & Brown, Inc., October, 1972

D. McCarran International Airport, Stage I Report, First Draft, Landrum & Brown, Inc., July, 1974

United States Department of the Interior
BUREAU OF RECLAMATION
LOWER COLORADO REGIONAL OFFICE
P.O. BOX 427
BOULDER CITY, NEVADA 89005

IN REPLY
REFER TO: LC-150
520.

JUN 21 1974

Mr. Donald L. Paff, Administrator
Colorado River Commission of Nevada
P. O. Box 1748
Las Vegas, Nevada 89101

Dear Mr. Paff:

As discussed with you and members of my staff at a meeting in Boulder City on June 19, 1974, we are enclosing two copies of a map and brief description of the possible routing of the connecting transmission lines, Granite Reef Aqueduct, Central Arizona Project, in the vicinity of the Eldorado Valley. The routing in this area is still under study, and a final route has not been selected.

Construction of this segment of the transmission system is not scheduled until 1983. However, we plan to file a draft environmental impact statement on the project the latter part of 1974. We anticipate that the route selection in this area will remain flexible until such time as all factors have been thoroughly evaluated.

We would appreciate any comments you may have regarding this subject. We will keep you apprised of the progress on this project.

Sincerely,

E. A. Lundberg

E. A. Lundberg
Regional Director

Enclosures 2 in duplicate

RECEIVED
JUN 24 1974
[illegible]

JOHNNY HORIZON
'76

COPY

Boulder City, Nevada
June 21, 1974

PROPOSED McCULLOUGH-MEAD 230-kV TRANSMISSION LINE
CENTRAL ARIZONA PROJECT TRANSMISSION SYSTEM

Route No. 1 (Proposed)

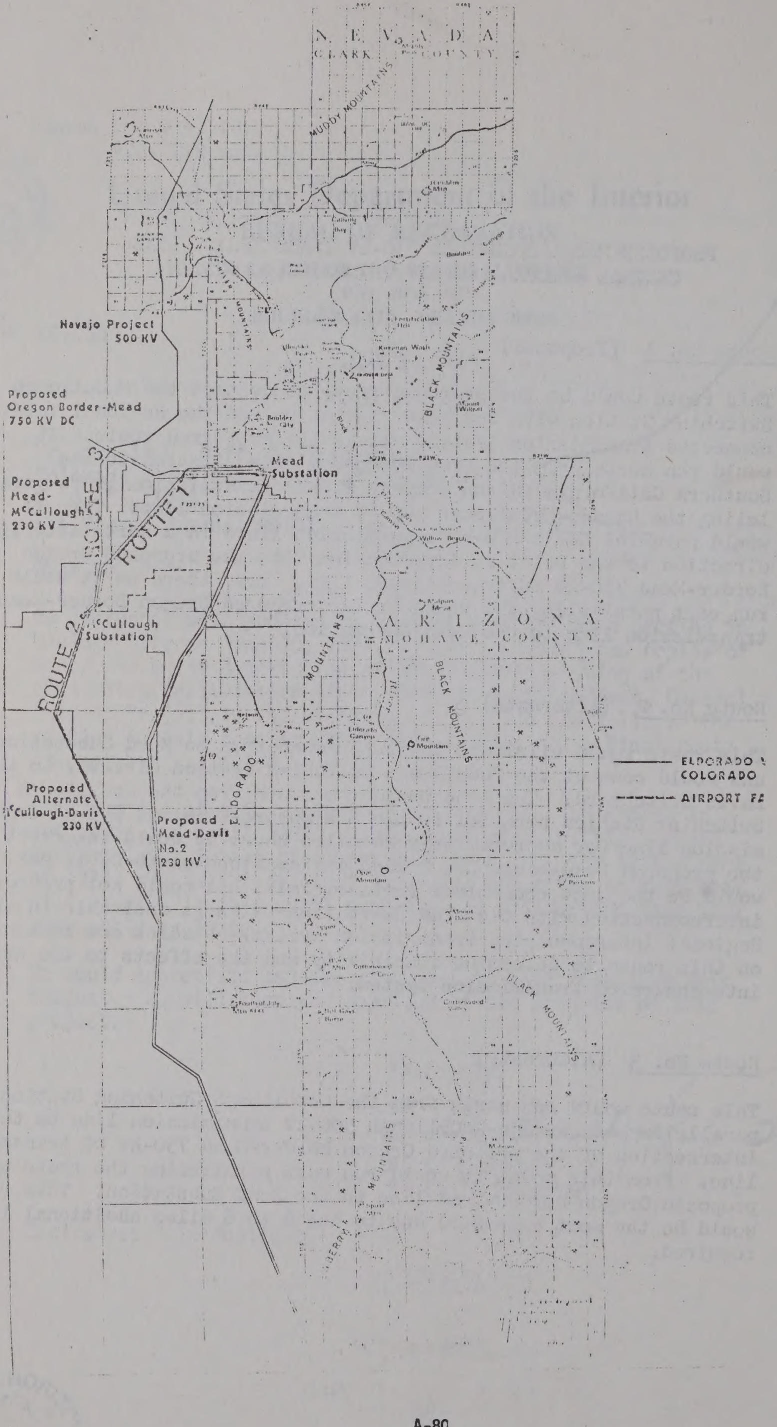
This route would be the shortest route to connect the McCullough Switching Station with the Mead Substation and the Regional interconnected transmission system, and is the preferred route. It would run north from the McCullough Switching Station to the Southern California Edison Company 220-kV transmission lines paralleling the Navajo-McCullough 500-kV transmission line. Then it would parallel SCE's 220-kV transmission lines in a northeasterly direction to the point of intersection with the proposed Oregon Border-Mead 750-kV DC transmission line. From there on it would run east paralleling the route of the proposed Oregon Border-Mead transmission line to the Mead Substation.

Route No. 2 (Alternate)

This route would eliminate the interconnection to Mead Substation and would connect the McCullough Switching Station directly to the Davis Switchyard. The line would run south from the McCullough Switching Station parallel to the SCE Mohave-Eldorado 500-kV transmission line for approximately 2¼ miles where it would intersect the proposed Mead-Davis No. 2 line and continue on to Davis Dam. It would be the most economical route overall, but would not provide an interconnection with the Mead Substation which is desirable in the Regional interconnected transmission system. Studies are continuing on this route to determine feasibility and the effects to the Regional interconnected transmission system.

Route No. 3 (Alternate)

This route would run north from the McCullough Switching Station paralleling the Navajo-McCullough 500-kV transmission line to the intersection of the proposed Oregon Border-Mead 750-kV DC transmission line. From this point it would run east paralleling the route of the proposed Oregon Border-Mead line to the Mead Substation. This route would be the most expensive due to the 6 to 8 miles additional length required.


N E V A D A
CLARK COUNTY
MUDDY MOUNTAINS
Callville Bay
Boulder Canyon
Fortification Hill
Kingman Wash
Hoover Dam
Boulder City
Black Canyon
Mount Wilson
BLACK MOUNTAINS
Navajo Project 500 KV
Proposed Oregon Border-Mead 750 KV DC
Mead Substation
Proposed Mead-McCullough 230 KV
ROUTE 3
ROUTE 1
ROUTE 2
McCullough Substation
Willow Beach
Malpais Mesa
A R I Z O N A
MOHAVE COUNTY
BLACK MOUNTAINS
MOUNTAINS
Nelson
Eldorado Canyon
Fire Mountain
ELDORADO
Proposed Alternate McCullough-Davis 230 KV
Proposed Mead-Davis No. 2 230 KV
Opal Mountain
Mount Perkins
Mount Davis
Cottonwood Cove
Cottonwood Valley
Bill Gay Butte
BLACK MOUNTAINS
MOUNTAINS
Spirit Mtn
NEWBERRY
ELDORADO
COLORADO
AIRPORT FA

STATE OF NEVADA

DIVISION OF
COLORADO RIVER RESOURCES
P.O. Box 1748
LAS VEGAS, NEVADA 89101
TELEPHONE (702) 384-5135

MIKE O'CALLAGHAN
GOVERNOR

DONALD L. PAFF
ADMINISTRATOR

September 30, 1974

Mr. E. A. Lundberg
Regional Director
Lower Colorado Regional Office
U. S. Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

COPY

Please refer to your letter of June 21, 1974 and to your June 14, 1974 Notice of Direct Federal Development Project (Form DI-711) as forwarded to this Division from its original addressee, State Planning Coordinator, Carson City, regarding the Granite Reef Aqueduct Power Transmission System.

The various routes as indicated in your June 21 correspondence have been discussed in detail by a special subcommittee of the Eldorado Valley Advisory Group and a recommendation has been approved from the Group by the Colorado River Advisory Commission.

It is therefore our suggestion that Route 3 of your enclosure in the letter of June 21 be the preferred route with the least impact on the Eldorado Valley Development Area as optioned to the State of Nevada under Public Law 85-339, the Eldorado Valley Act of March 6, 1958.

We are aware that an Environmental Impact Statement is presently under preparation and is due to be filed between October 15 and November 1, 1974.

We also understand that a public hearing will be held within 45 days of the filing with the Council on Environmental Quality at Lake Havasu City, and that this Division will receive a copy of the Statement as well as an announcement of the public hearing. The State of Nevada will plan to have input at that time.

Regional Director
U. S. Bureau of Reclamation
Boulder City, Nevada 89005

September 27, 1974
Page 2

We further understand that construction of the transmission system will not be scheduled until 1983, and that the route selection is and will remain somewhat flexible and dependent upon further power flow studies for the Central Arizona Project.

Our May 31, 1974 letter to Mr. Pugh (copy attached) requested further information as to rights of way widths and other available information upon which we could base a decision. We have not received this information as of this date.

Had [illegible] [illegible] 155 feet [illegible] a function of [illegible]

In conclusion, our preference is Right of Way Alternative 3, subject to further review by the Eldorado Valley Advisory Group as additional information is received, in addition, we would plan to comment upon the Environmental Statement.

Sincerely,

Donald L. Paff
Administrator

Enclosure

cc: Mr. Bruce Arkell, State Planning Coordinator
State Capitol Building
Room 57
Carson City, Nevada 89701

Mr. C. A. Pugh
Project Manager
U. S. Department of the Interior
Bureau of Reclamation Arizona Projects Office
Lower Colorado River Region
135 N. 2nd Avenue
Phoenix, Arizona 85005

bcc: Mr. A. B. West
315 Utah Street
Boulder City, Nevada 89005

TFW:blm

Replies to Comments Made by the
Division of Colorado River Resources
State of Nevada
(Memorandum dated December 18, 1974)
(Submitted by the State of Nevada Office
of the State Planning Coordinator
by letter of December 24, 1974)

1. Comment: A. The impact of that 21.3 mile portion of the McCullough-Mead-Davis line crossing the Eldorado Valley in Southern Nevada is not clearly or fully identified. The statement does not reflect future potential of the Eldorado Valley development nor the land use restrictions imposed by the actual right-of-way or adjacent areas.

   B. The Eldorado Valley Advisory Group (Nevada Revised Statutes 321.430 and 321.440) has indicated its preference of routes as "Alternative 3" (Route running north from the McCullough Switching Station paralleling the Navajo-McCullough 500 KV line to the intersection of the proposed Oregon Border-Mead 750 KV d.c. line, thence running east paralleling the route of the proposed Oregon Border-Mead line to the Mead Substation). The draft Statement does not, in our opinion, present any information that modifies that preference, in addition, should the potential of an airport in the Eldorado Valley be realized even this preferenced route would present economic and environmental problems.

   Reply: Public Law 85-339 dated March 6, 1958 (72 Stat. 31) was amended by Public Law 87-784 dated October 10, 1962 (76 Stat. 804). The amendment extending the deadline date for action and specific selection and procedures by Nevada after a plan of development had been submitted as required by the original act. The Eldorado Valley Development Plan reported in the news media as recently as January 7, 1975, has not been completed for submittal to the Secretary of the Interior. The shifting of any air transport center to Eldorado Valley and the affect upon arriving and departing passengers would be an impact that would be explored and discussed in the environmental statement that would precede the transfer of any Federal lands to the State under provisions of the statute. The future or potential development of the Eldorado Valley must take into account the following environmental factors; water supply availability, water and air quality, waste water treatment, flood control, archeology, vegetation, wildlife, flood zoning, topographic air navigation hazards, and flood insurance impacts. These factors would be of primary concern before considering existing utilities right-of-way that would have to be violated. In the report by Landrum and Brown on the Clark County Airport System Plan, the incomplete analysis of environmental factors for the Eldorado Valley major air facility ranked this site fifth of five examined.

From General Comment B in the last sentence, this routing is discussed as an alternative. The location of an airport in the Eldorado Valley appears to be hypothetical.

Specific comments from Attachment II and replies to them are set forth in the following.

1. Comment: A. Figure 3, following page 12: Since the following text refers to Public Law 85-339 lands under option to the State of Nevada, we would suggest that the boundary of these optioned lands be designated in Figure 3 and all other figures following which show the Nevada section of the transmission line.

   Reply: The location of the optioned lands have been delineated on the land status drawings for the Nevada section.

2. Comment: B. Page 38, last paragraph, first sentence: The State of Nevada in its Public Law 85-339 land option has established a precedence in reserving the right to impose relocation conditions on easements where they have been contradictory to planning objectives such as a future major air-carrier airport. The acquisition of rights-of-way in the form of "a perpetual easement" is therefore open to modification within the Eldorado Valley Development Area. (See General Comments.)

   Reply: Recognition is acknowledged of the State's claim to impose relocation conditions on right-of-way easements granted subsequent to enactment of Public Law 85-339. Section I.E.3. has been modified to recognize the above comment.

3. Comment: C. Page 40 and 41, under heading Land Use: Since there is apparently no present valid right pertaining to the additional right-of-way required as conditioned in Sec. 5 of Public Law 85-339, it is our belief that the State has an authority in the determination of rights-of-way routes which may be selected, pursuant to Sec. 2 of the Act which directs the Secretary to segregate the optioned lands from all forms of entry, since the State has filed for transfer and Section 7 of the Act is in effect. The plan of development

referred to in the first full paragraph should also refer to planning documents of the Clark County Director of Aviation as listed in Items C and D of Attachment III.

Reply: A copy of the Plan of Development and the other planning documents were obtained from the Division of Colorado River Resources. Supporting information relative to the plans, provisions for complying with requirements regarding archeological resources, endangered species, air quality, noise pollution, water supply, flood control zoning, flood insurance, waste water treatment and water quality control. Modification of Section I.E.4. has been made as appropriate for the several above items and the BLM's Stateline Unit planning report.

4. Comment: D. Page 47, second full paragraph: We would suggest more specific benefactors in the mutual interrelationship of the integrated CAP system, such as customers of U.S., Parker-Davis, Hoover, and CRSP hydropower.

Reply: The Interconnected Power Systems map (Dwg. No. 743-300-1) previously in Section IX.A. as Figure 61 has been moved to Section I.G. to illustrate the point raised at an earlier point in the report.

5. Comment: E. On page 50, first full paragraph, first line: Insert "surface" between no and drainage.

Reply: This comment applicable to the second full paragraph has been considered in light of surface and ground-water drainage, The National Flood Insurance Protection Act of 1968, and the Flood Disaster Protection Act of 1973. The paragraphs in Sections II.A. and II.G. have been modified as appropriate in light of the definitive data available.

6. Comment: F. Page 73, last sentence: add "potable" between for and ground since some test wells have resulted in limited amounts of relatively high saline water.

Reply: The suggested clarification has been made.

7. Comment: G. Page 78, third paragraph: The annex and/or bibliography should include the provisions of Public Law 85-339 for completeness.

Reply: Public Law references to Public Law 85-339, as amended, are used without appending them and are adequate for identification and relevance without including a copy in the appended material and are one of the measures taken to reduce the size of this environmental statement.

8. Comment: H. Figure 47 - See Item A. Lands reserved for State of Nevada under Public Law 85-339 are not clearly identifiable and cross-hatching the entire withdrawn area would be a better method of presentation.

Reply: The area of the referenced lands has been delineated on appropriate maps.

9. Comment: I. Page 85, second full paragraph: We are led to believe that BLM planning within the Public Law 85-339 Eldorado Valley Development Area is not to be carried out pending specific State land use planning proposals.

Reply: The Bureau of Land Management in its planning responsibility for Federal lands under its jurisdiction has established the Stateline Planning Unit. This planning unit includes the Eldorado Valley Development Area because of the need to provide an overall comprehensive plan for lands outside the Eldorado Development Area but which would be coordinated with, and complimentary to, such a development area when it comes to fruition. It is also necessary to identify the total resource base of the planning unit for subsequent environmental analysis and statement preparation in the event future actions or Federal programs may be significant or controversial. Reclamation has coordinated with BLM and other Interior agencies with regard to responsibilities legislatively and administratively mandated since the date 16 years ago of the Public Law 85-339. Close coordination with BLM and other agencies is required to insure that current environmental and resource data are included in the planning for the area.

10. Comment: J. Page 88-89: The two paragraphs do not adequately depict the status of Nevada planning under Public Law 85-339 as it exists today. The State, through the Division of Colorado River Resources, has applied for the land under option to the Secretary of the Interior and is awaiting the acceptance of the application and acceptance of the preliminary General Plan Amendments of 1969. The State goal as published by the State Planning Coordinator in 1974 is of particular interest in regard to planning and the intent of the State in carrying through its option.

Reply: Reference is made to Comment C and response. An evaluation of the environmental impacts of the State Plan will have to be made prior to the completion of processing of option exercises. The adequacy of Nevada planning is being evaluated from the primary factual reports submitted by Nevada after the review of this Draft

Environmental Statement. The State goal is of interest with respect to environmental protection and energy conservation.

11. Comment: K. Page 95, first paragraph: The State has clearly indentified its position in past land sales agreements, and in previous powerline environmental statement comments, that Nevada industries, services, and labor be utilized wherever possible for projects within the State, and this should be recognized wherever this subject is brought up.

Reply: Section III.B.1. has been modified with respect to labor supply sources.

12. Comment: L. Page 102, first three paragraphs: This section of the statement "Impacts on Man" for the Nevada transmission line segment has been overly brief and simplified, since Item K. (above), future land use, and other impacts have not been adequately dealt with in light of the before referenced Nevada State Goals, the Landrum & Brown "Clark County Airport System Plan," and DCRR "Policies for Development of the Eldorado Valley" (Appendix A-50).

Reply: The Draft Statement was prepared without the benefit of the information contained in the first two references which have subsequently been received from the Division and evaluated. Section II.B.1.d. has been reviewed and edited in light of the recently provided information.

13. Comment: M. Page 118, first paragraph: In spite of the statement represented in this paragraph, it is obvious that present land use is not the important criteria, but future land use is an essential consideration in this area which is immediately adjacent to one of the fastest growing portions of the nation.

Reply: This Section II.C. relates to operation and maintenance of the system as differentiated from construction which was discussed in Section II.B. This section has been edited for clarification between construction and operation and maintenance. Additionally, the impact of this one additional line should be viewed in light of the existing network of 12 lines of 69-kV, 138-kV, 230-kV, 287.5-kV, 345-kV, and 500-kV.

14. Comment: N. Page 119, second paragraph: Electrical interference would be a major problem contribution by the transmission line in proximity to the Eldorado Valley Development Area now under consideration for a major air-carrier airport. This interference would affect navigation and other instrument approach capabilities.

Reply: Reference is made to Figures 3 and 37. The characterization of this single 230-kV line as being a major problem should again be viewed in light of the numerous existing 69-kV, 138-kV, 230-kV, 287.5-kV, and 500-kV lines and the deferred 750 DC kV line in the area. The incremental effect will add to the cumulative effect but by itself should not be a major interference source.

15. Comment: O. Page 121, second paragraph: Refer to Attachment I as they apply to availability of excess generating and transmission capacity.

Reply: Transmission lines and generating stations are constructed in phases to meet specific load requirements in relation to time. Any expansion of the Eldorado Valley or the requirements of new customers along the route cannot be predicated on the Granite Reef Aqueduct transmission line which is being constructed to supply the CAP portion of Navajo Project power to CAP. Energy in excess of that required for pumping will be determined on a forecasted schedule--probably for a 3-year duration and will be marketed so as to produce the greatest practicable amount of power and energy that can be sold at firm power and energy rates.

16. Comment: P. Page 123, first full paragraph: See Item M., above.

Reply: Appraisal experience indicates that for conditions like the Eldorado Valley with 12 existing lines (see Reply to M. and N. above) the addition of one or more lines to an existing corridor is negligible.

17. Comment: Q. Page 125, first full paragraph: The future use of P.L. 85-339 lands are now restricted by present transmission lines which regretably may have to be relocated in the future. The economic impact of another new line paralleling the present lines would certainly represent an adverse impact to the State of Nevada and future development of the Eldorado Valley.

Reply: Nevada may consider conditioning a new line right-of-way to future moving at owner's expense, as claimed in Comments B. and C. above. In the event the adverse impact would fall upon Reclamation and the Central Arizona Project and not the state of Nevada for this proposed line. The admission here and in other comments that P.L. 85-339 lands are now restricted by present lines weakens the weight of the comments about future development of the Eldorado Valley in particular for a major air-carrier facility.

18. Comment: R. Page 126, first paragraph: This paragraph should also reflect the hazard of aircraft approach and landing patterns in the proposed Eldorado Valley airport.

Reply: Section III.C.2.b. relating to air space and aircraft, has been modified to recognize this contingency. This comment is related to Comment Q. and Reply above.

19. Comment: S. Page 132, Summary Paragraph: Mention should be cited of the consumptive use of the resource land in the Eldorado Valley Development Area which is precluded from being put into the use planned for it unless the McCullough-Mead-Davis alinement is changed.

Reply: Section III.D.1.: Summary has been expanded to indicate the relative incremental impact of one additional paralleling line in the area of 12 existing lines.

20. Comment: T. Page 133, fourth and fifth paragraphs: Refer again to Item K. concerning use of Nevada labor, services, and industries in this construction project.

Reply: Sections III.E.2.b. and c. have been modified with regard to labor and in line with reply to comment K. above.

21. Comment: U. Page 137, second full paragraph: Again, present land use should be deemphasized and future land use should be more forcefully and completely addressed.

Reply: The potential development of the Eldorado Valley closed basin as a satellite city to Las Vegas is speculative. The present land use particularly for transportation and utility corridors under the policy guidelines enunciated by Congress in Public Law 93-153, sections (p) and (s) is subjective and descriptive. All future land use for satellite cities will have to be planned with greater consideration to all environmental and land use laws enacted since P. L. 85-339.

22. Comment: V. Page 150, first full paragraph: There will also be restrictions to future land use on a large portion of the 105,000 acres of the Eldorado Valley, since airport consultants have stressed that a major, full-scale air-carrier operation can be oriented in only one particular orientation within the Valley. This also applies to and negates the discussion on page 153, last six lines.

Reply: The referenced pages (Sections V and VI) have been reviewed and edited.

23. Comment: W. Page 159 to page 204 should be written to take into account additional alternatives which reroute the McCullough-Mead-Davis lines within the Eldorado Valley. Reference is particularly directed to Mr. E. Al (sic) Lundberg's letter of June 21, 1974, to Mr. D. L. Paff-CRC, and alternate route 3 which was recommended by a special subcommittee of the Eldorado Valley Advisory Group as stated in Mr. Paff's letter of September 30, 1974. Figure 55 should be revised to show the several alternatives presented in the USBR June 21 letter, and the outline of P.L. 85-339 lands should also be more clearly marked.

Reply: The alternate routes referred to in the June 21, 1974, letter are described in Sections VIII.C.a. and b. Section VIII.C.a., paragraph 3 is a direct quotation from the enclosure to the referenced letter for Alternate Route No. 3. Section VIII.C.b., paragraph 2 is a direct quotation from the enclosure to the referenced letter for Alternate Route No. 2, except the last sentence was omitted. The Alternate Route No. 3 has been added to Dwg. No. 344-330-902 (Fig. 55 in the DES). Discussion of additional alternatives from those covered in the above two sections and the three presented in Section VIII.B.1., 2., and 3. would be speculative.

24. Comment: X. Page 189, last sentence of first partial paragraph: This statement is utterly false and misleading when viewed in context of the Eldorado Valley Development Plan for a county air-carrier facility.

We would affirm paragraph 2 on page 189 and add some degree of emphasis to the last line of the last paragraph. The economics of relocation in ten (sic) years may far overshadow the cost of 6 to 8 additional miles of line in the initial construction stage. We feel this alternative should be included in figure 55.

Reply: This comment covers Section VIII.C.1.a. as discussed in the preceding reply.

25. Comment: Y. Page 206: We note that the Nevada Power Company proposed Allen Project is not included in this table.

Reply: The Allen Project has been added to the Table.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL HOUSING ADMINISTRATION
PHOENIX INSURING OFFICE
244 WEST OSBORN ROAD
PHOENIX, ARIZONA 85013

REGION IX
450 Golden Gate Avenue
P.O. Box 36003
San Francisco, California 94102

December 26, 1974

IN REPLY REFER TO
9.3U -- Badraun

U. S. Department of the Interior
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

Gentlemen:

Subject: Draft Environmental Statement on the Granite Reef Aqueduct Transmission System, Control Number INT DES 74-105

Please be advised that this office has reviewed the referenced Draft Environmental Statement, dated November 14, 1974, and has no comment.

Sincerely,

Donald J. Karl
Acting Director

Reply to Comment by the Department of Housing and Urban Development Phoenix, Arizona (Letter dated December 26, 1974)

No reply to this letter is considered necessary.

SIERRA CLUB

Grand Canyon Chapter · Arizona

December 27, 1974

Mr. E.A. Lundberg, Regional Director
Lower Colorado Region, US Bureau of Reclamat:
Post Office Box 427
Boulder City, Nevada 89005

Subject: Comments on Draft Environmental Statement
Granite Reef Aqueduct Transmission System
(INT DES 74-105)

Dear Mr. Lundberg:

This letter is a statement of the Sierra Club comments on the subject draft environmental statement. It is submitted in accordance with your form letter of transmittal of 15 November 1974, which states that there is a 45-day review period in which written comments may be submitted to your office for consideration and incorporation into the final environmental statement. We do requext that these comments be considered in drafting the final environmental statement and that this letter be appended thereto.

This environmental statement is well done. The concern expressed for the mitigation of environmental impact together with the thoroughness of the planning which is described in the EIS certainly does credit to the Bureau of Reclamation, in terms both of engineering and of effectiveness and acceptability.

Lest the above statement tend to dilute our previous comments concerning the Central Arizona Project in general, please refer to the following:

1) Sierra Club Southwest Regional Conservation letter of 26 October to E.A. Lundberg, Regional Director, Lower Colorado Region, US Bureau of Reclamation, which comments on the overall Draft EIS for the CAP (the letter was reproduced in Appendix C, Pages 121-141, CAP Final EIS,

la sección del rincón · tucson area
palo verde group · phoenix area
plateau group · flagstaff area

INT FES 72-35);

2) Sierra Club SW RCC Letter of 12 April 1972, To Mr. Lundberg, which comments on the Draft EIS for the Havasu Features of the CAP (reproduced in Appendix A, pages A-55 - A-59, Havasu Features Final EIS, INT FES 73-2);

3) Sierra Club SW RCC letter of 5 December 1972, to Russell E. Train, Chairman, CEQ, which was a critique of the Final EIS for the overall CAP and of the project itself (copies distributed to the Department of the Interior, Bureau of Reclamation, and others);

4) Sierra Club SW RCC letter of 9 May 1973 to Mr. Lundberg, which comments on the Draft EIS for the Granite Reef Aqueduct (reproduced in Appendix A, pages A-115- A-123, Granite Reef Aqueduct Final EIS, INT FES 74-5). These previous comments have not been dealt with adequately by the Bureau of Reclamation, and we hold to our opinion that the Central Arizona Project is both economically infeasible and environmentally unacceptable.

Despite the thouroughness of planning, some environmental damage will undoubtedly be done by the Granite Reef Aqueduct Transmission System, which will constitute an increment to the overall environmental harm to be done by the project as a whole. We consider this harm to be the result of an unfavorable tradeoff to the detriment of the environmental quality objective. Discussed below are some points which should be cleared up concerning the envirnmental impact of the Transmission System.

On page 133 there is a remark under "Unquantified Impacts" which reads:

"Growth in Arizona is projected to be 50 percent in 10 years between 1970 and 1980. Population centers of Phoenix and Tucson will be affected by most of this growth.

"Electrical system reliability improvement will make this growth easier to cope with."

This remark is written as though describing a benefit whereas in our view it represents a cost. It fits well with our discussion of the growth mania and its relation to the CAP. A partial quotation follows:

"Thus, a very expensive social cost of the CAP will originate in its encouragement of a psychology which drastically threatens the quality and pleasure of living in Arizona, for even though it will not in itself be essential to growth it will abet the growth idea and stimulate the urge forgrowth. In this way it becomes a sort of multiplier for the growth that would take place anyhow, without it." From page 18 of Item 1 in the list of Sierra Club comments above.

On Pages 135 and 207 is the repetition of an idea that borders on the ridiculous. To quote the remark from the latter reference:

"It has been estimated that the electrical power requirements in this region are expected to increase by forty-fold between 1965 and 2020."

There are only 35 years between 1965 and 2020, and in this short period electric power "requirements" are expected to grow forty-fold, or 4,000% ! This is the sort of forecast that is a derivative of the power company projection that the demand for electric power will double every ten years. It is in the parroting of ideas like this that may lie the future ruination of both the Southwest and the country at large, for even if we discount the possibility that they may become self-fulfilling, they most certainly throw a block in the way of all attempts to bring our national use of energy in the perspective of the reasonable.

Throughout the EIS there is a lack of acknowledgement of what appears to be a real danger to the bighorn sheep populations in the area of the Granite Reef Aqueduct and its associated Transmission System.

According to the Final EIS for the Granite Reef Aqueduct, Page 44:

"Bighorn sheep populations are estimated by the extent of mountain habitat areas. The Arizona Game and Fish Department estimates the total population of bighorn sheep in the State as 3,000 animals. Only three mountain areas along the aqueduct now support resident populations. The Buckskin Mountains have a population of approximately 50 animals. The Harquahala Mountains have only a remnant population and the Eagletail Mountains support approximately 30 individuals. Other ranges historically had sheep but now support only transient individuals. This situation may also be applicable to the Harquahala Mountains."

Figure 12 of the Final EIS for the Havasu Features of the CAP is a map showing bighorn sheep use of the Buckskin Mountains. The map shows both the areas used generally and the lambing areas. It is noted that the two 161 kv Parker-Phoenix transmission lines, one of which is to be replaced by a 230 kv Parker-Liberty line as part of the Granite Reef Aqueduct Transmission System, pass right through the wishbone-shped area of heavier use, bisecting it, and that there are lambing areas within a mile or so on either side. The area affected is shown in a photograph in Figure 23 of the Draft EIS under review, and on Page 112 there is a reference to the area shown in Figure 23 as typical sheep habitat.

On Pages A-15 and A-16, there is reproduced a letter of the Arizona Game and Fish Department in which misgivings concerning the bighorn sheep in the Harquahala Mountains are expressed becouse of the encroachment of the Harcuvar Substation-Little Harquahala Pumping Plant transmission line. It appears that the route of this transmission line may since have been arranged to skirt the Little Harquahala Mountains rather that directly encroaching on them, but this is not clear from any information presented or from the map in Figure 7 of the Draft EIS. Thus the Arizona Game and Fish Department misgivings may still be valid. This point should be clarified.

The main effect on the bighorn sheep, already subject to disturbance there by the construction of the Granite Reef Aqueduct and the Havasu Features of the Central Arizona Project, will apparently be in Buckskin Mountains. This threat appears to be real, yet it is fully discounted in the Draft EIS. It is our firm conclusion from the information provided that unless there are mitigating features prescribing how the construction in the area will be accomplished by the contractor there is considerable chance of harm to the Buckskin Mountains population. The lambing season should probably be avoided and the intensity of the work in point of time should be limited.

We urge that this whole matter of the impact on the bighorn sheep in the area of the Transmission System be carefully reconsidered.

Sincerely,

Jan Herwick

Jan Herwick
Henry M. Zeller
Water Resource Studies
Grand Canyon Chapter
Sierra Club
2950 North 7th Street,
Phoenix, Arizona 85014

Reply to Comments by
Sierra Club
Phoenix, Arizona
(Letter dated December 27, 1974)

The Sierra Club letter makes specific reference to previous letters that are bound in the referenced environmental statements. Replies to specific comments are to be found in those same volumes. Replies follow to specific comments from the December 27, 1974, letter.

1. Comment: On page 133 there is a remark under "Unquantified Impacts" which reads:

> "Growth in Arizona is projected to be 50 percent in 10 years between 1970 and 1980. Population centers of Phoenix and Tucson will be affected by most of this growth.
>
> "Electrical system reliability improvement will make this growth easier to cope with."

This remark is written as though describing a benefit whereas in our view it represents a cost.

Reply: The unquantified nature of the Population Growth Impact (page 133 of the draft statement) is believed to be a factual statement of the projected growth from the reference documents and the impact of the transmission system upon the area's integrated power system to meet the future power demands. To some individuals, growth "per se" is an adverse impact, to others it is an unquantified neutral result of a free society, to others it is an opportunity to be pursued to allow others to enjoy the amenities of the area that attracted them from other locations.

2. Comment: On Pages 135 and 207 is the repetition of an idea that borders on the ridiculous. To quote the remark from the latter reference:

> "It has been estimated that the electrical power requirements in this region are expected to increase by forty-fold between 1965 and 2020."

There are only 35 years between 1965 and 2020, and in this short period electric power "requirements" are expected to grow to forty-fold, or 4,000%! This is the sort of forecast that is a derivative of the power company projection that the demand for electric power will double every ten years.

Reply: The references to page 135 (IV.E.) and page 207 (IX.A.) refer to projections developed in the Lower Colorado River

Framework Studies. The latest review of energy requirement studies have been made utilizing assumptions appreciably different from those utilized for the Framework Studies. The possibility of revised projections for the period between 1972 and 1990 is recognized for this final environmental statement in light of the current energy and economic situation. These new estimates are based on studies by the Western States Water Council and are taken from the report "Western States Water Requirements for Energy Development to 1990."

3. Comment: On Pages A-15 and A-16, there is reproduced a letter of the Arizona Game and Fish Department in which misgivings concerning the bighorn sheep in the Harquahala Mountains are expressed because of the encroachment of the Harcuvar Substation-Little Harquahala Pumping Plant transmission line. It appears that the route of this transmission line may since have been arranged to skirt the Little Harquahala Mountains rather than directly encroaching on them, but this is not clear from any information presented or from the map in Figure 7 of the Draft EIS. Thus, the Arizona Game and Fish Department misgivings may still be valid. This point should be clarified.

   Reply: The referenced letter of the Arizona Game and Fish Department dated July 30, 1974, was a second response by the Department to a notice that an environmental statement was in the process of preparation. The Department's December 12, 1974, comments on the draft environmental statement are referred to. The point raised by the Sierra Club has been clarified in Section IV, and further reference is made to information in the reply to the Department's comments.

4. Comment: The main effect on the bighorn sheep, already subject to disturbance there by the construction of the Granite Reef Aqueduct and the Havasu Features of the Central Arizona Project, will apparently be in Buckskin Mountains. This threat appears to be real, yet it is fully discounted in the Draft EIS. It is our firm conclusion from the information provided that unless there are mitigating features prescribing how the construction in the area will be accomplished by the contractor there is considerable chance of harm to the Buckskin Mountains population. The lambing season should probably be avoided and the intensity of the work in point of time should be limited.

   Reply: The area described as the wishbone-shaped area of heavier use is bisected by Giers Wash. The wash itself receives minimal use by bighorns. The area of heavy use is at least 150 feet higher in elevation than the bottom of the wash.

The bottom of the wash is separated from the edge of the lambing areas by a minimum of 250 feet in elevation, and 0.5 miles of horizontal distance.

Some construction noises (blasting in particular) could cause a disturbance that would be detrimental to the bighorn population at lambing time. Therefore there will be no blasting allowed in the wash near the lambing areas from approximately January 15 to March 31.

WILLIAM H. WHEELER
CHAIRMAN
PETER F. BIANCO
VICE CHAIRMAN
WESLEY E. STEINER
EXECUTIVE DIRECTOR
AND
STATE WATER ENGINEER
VIRGINIA FRONABARGER
SECRETARY

Arizona Water Commission
222 NORTH CENTRAL AVENUE, SUITE 800
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MARSHALL HUMPHREY

December 27, 1974

Mr. E. A. Lundberg, Regional Director
United States Department of the Interior
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

We have reviewed the draft environmental statement pertaining to the Granite Reef Aqueduct Transmission System and believe that it represents a responsible and successful effort to identify impacts upon the environment in the area of the proposed transmission system.

In our role as a member of the State Power Plant and Transmission Line Siting Committee, we have become acutely aware that the use of certain planning concepts and techniques materially lessen environmental impacts created by the construction of transmission facilities. We note that many of these general concepts, such as the use of existing corridors, maintenance roads and existing topographic and vegetative features for screening, where feasible, are suggested for the proposed transmission system. For this particular transmission system, the use of proposed corridors has the added advantage of making it possible to replace an existing lower voltage line for much of the route - which would have to be replaced at a later date anyway - while also improving the integration of the federal transmission system in the southwest.

As part of our overall review of the draft impact statement, members of the Water Commission staff were also instructed to identify any impact it might have upon the water resources of the State or upon development plans for those resources. Aside from the transmission systems obvious relationship to the Central Arizona Project, no such impacts were identified.

With the understanding that the proposed transmission system is still in draft form and may be subject to modification in order to accommodate new information and the planning strategies of other entities, the Water Commission wishes to express its support for the plan as proposed.

Sincerely,

Wesley E. Steiner
Executive Director

Reply to Comments Made by
Arizona Water Commission
Phoenix, Arizona
(Letter of December 27, 1974)

The comments contained in this letter are generally favorable to the proposed action and no response is considered necessary.

L. H. BELL & ASSOCIATES
Diversified Consulting Services
(Subsidiary of Community Science Technology, Inc. CST)

L. H. Bell, P.E.
PRESIDENT
Loyd House, P.E.
VICE PRESIDENT
Donald Sloat, P.E.
VICE PRESIDENT
Curtis D. Drew, P.E.

TELEPHONE 267-7378
4635 E. WASHINGTON ST.
PHOENIX, ARIZONA 85034

December 30, 1974

Mr. David Creighton
Environmental Project Engineer
Bureau of Reclamation
Arizona Projects Division
135 North Second Avenue
Phoenix, Arizona 85003

Dear Mr. Creighton:

I have read your Environmental Impact Statement on the Granite Reef Project and would just like to compliment you on what I consider to be a job well done.

Sincerely yours,
L. H. BELL & ASSOCIATES

L. H. Bell,
President

LHB:rjm

Reply to Comments Made by
L. H. Bell & Associates
Phoenix, Arizona
(Letter of December 30, 1974)

No reply to this letter is considered necessary.

CAPEAG

CENTRAL ARIZONA PROJECT ENVIRONMENTAL ADVISORY GROUP

December 30, 1974

Mr. Ed Lundberg
Regional Director
Bureau of Reclamation
U. S. Department of the Interior
Boulder City, Nevada

Dear Mr. Lundberg:

At its sixth meeting in Phoenix, December 17, 1974, the Central Arizona Project Environmental Advisory Group discussed the Draft Environmental Statement on the Granite Reef Aqueduct Transmission System, and offers the following comments:

The Bureau is to be commended for utilizing an existing transmission corridor, instead of breaking fresh ground, despite the additional length of the corridor involved.

The various measures to be taken to mitigate environmental impact will be most helpful.

It was agreed that the statement was well organized and informative, a commendable work.

Yours sincerely,

F. J. MacDonald
Member

FJM:jfj

Members of the CAPEAG

Mr. F. Phillip Sharpe, Chairman
Mrs. Stephen Detzer
Mr. Rich Johnson
Mr. Ray Killian
Mr. F. J. MacDonald
Mr. Thomas [illegible]
Mr. William [illegible]

Reply to Comments Made by the
Central Arizona Project Environmental
Advisory Group
(Letter of December 30, 1974)

No reply to this letter is considered necessary.

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

HEALTH AND
ENVIRONMENT

20.

CENTRAL ARIZONA PROJECT

30 DEC 1974

Mr. William F. Graham
Acting Assistant Commissioner
U.S. Department of the Interior
Bureau of Reclamation
Washington, D.C. 20240

Dear Mr. Graham:

This is in response to your request of November 15, 1974 to review the draft environmental impact statement "Granite Reef Aqueduct Transmission System, Central Arizona Project."

We have reviewed your proposal, and have no substantive comments to offer.

Sincerely,

H. R. Smith
Acting Deputy Asst Secretary of Defense
(Environmental Quality)

Reply to Comment Made by
Assistant Secretary of Defense
Washington, D.C.
(Letter of December 30, 1974)

No reply to this letter is considered necessary.

CLARK COUNTY REGIONAL PLANNING COUNCIL
COUNTY COURTHOUSE ANNEX
400 LAS VEGAS BLVD. SOUTH
LAS VEGAS, NEVADA 89101

(702) 386-4011

December 31, 1974

MR. E. A. LUNDBERG
Regional Director
U. S. Department of the Interior
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

RE: Granite Reef Aqueduct Transmission System
Environmental Statement

This item came before the Council's regularly scheduled Technical Committee meeting on December 10, 1974. Action by the Technical Committee was approval of the document with the consideration that all development follow the existing corridors now established.

The Regional Planning Council discussed this item in their meeting of December 19, 1974 and concurred with the Technical Committee including the recommendation that all development follow existing corridors.

If you have any questions concerning these actions, please feel free to inquire.

Sincerely,

CLARK COUNTY REGIONAL PLANNING COUNCIL
EDWARD F. DAVIS, EXECUTIVE DIRECTOR

by: RC Heckendorf
Richard C. Heckendorf
Urban Planner

EFD/RCH/cc

County of Clark; Cities of Boulder City · Henderson · Las Vegas · North Las Vegas
Clark County School District · Las Vegas Valley Water District

Reply to Comments Made by
Clark County Regional Planning Council
Las Vegas, Nevada
(Letter of December 31, 1974)

1. Comment: This item came before the Council's regularly scheduled Technical Committee meeting on December 10, 1974. Action by the Technical Committee was approval of the document with the consideration that all development follow the existing corridors now established.

   The Regional Planning Council discussed this item in their meeting of December 19, 1974 and concurred with the Technical Committee including the recommendation that all development follow existing corridors.

   Reply: Figure No. 4 was reviewed and the only location where the new alinement departs from an existing corridor in Clark County lies at the southern end of the Lake Mead National Recreation Area for a distance of 3-1/2 miles.

LAW OFFICES
SNOWBERGER & LARSON
SEVENTEENTH FLOOR
UNITED BANK BUILDING
PHOENIX, ARIZONA 85012

JOHN R. SNOWBERGER
WALLACE L. LARSON

R. McCAULEY
OF COUNSEL

December 31, 1974

AIR MAIL
CERTIFIED MAIL
RETURN RECEIPT REQUESTED

CERTIFIED MAIL
No. 307828

Mr. Edward M. Lundberg
Lower Colorado Regional Director
Bureau of Reclamation
Post Office Box 427
Boulder City, Nevada 89005

RE: Comment on and objection to
the Granite Reef Aqueduct
Transmission System

Dear Mr. Lundberg:

As captioned above, we submit on behalf of our clients, Havasu Heights Ranch and Development Corporation (hereinafter sometimes referred to as Corporation), this written response and objection to Draft Environmental Statement No. INT DES 74-105. While we can appreciate important purposes served by the Central Arizona Project, we must take exception to the proposed present location of the transmission system as we understand same.

Havasu Heights Ranch and Development Corporation has holdings covering nearly 20,000 acres in Mohave County, Arizona, and attached hereto marked as Exhibit A, and incorporated by reference into this correspondence as Exhibit A, is a list of legal descriptions of said property. The Corporation has owned some of the land and held federal and state leases on this property contiguous to and surrounding Lake Havasu City, Mohave County, Arizona, for over the last ten years. Based upon the proposed route set forth in Figure 4 of the "Draft Environmental Statement", the system would traverse these holdings to the detriment of not only our client but the overall economic growth of Mohave County, Arizona.

Presently, the Corporation has imminent plans to develop on approximately 15,200 acres presently leased commercially to the Corporation by the State of Arizona a planned community development consisting of residential, commercial, light industrial, civic, park and recreational development. A report entitled "Land Transference in Mohave County - Study and Proposal" is on file with the Arizona State Land Department and is being actively considered by the State presently. This report was prepared at the Corporation's request by the internationally renowned architectural firm Perry, Dean & Stewart, which has offices in Boston, Massachusetts, and computer-aided design centers in Washington, D. C. and Phoenix, Arizona. An expression of interest in Colorado River water, as prepared by our clients and their advisors, is on file with the Arizona Water Commission for nearly 4 billion gallons of water eventually to be used to service a projected population in the planned community of nearly 50,000 residents by the year 2000. A leading American hotel corporation, which operates internationally, has expressed interest in locating a major facility within the proposed development. Also, a prominent pharmaceutical company has expressed similar interest.

The property most intimately affected by the location of the system proposed in Figure 4 of the Draft Environmental Statement appears to be as follows:

T14N R19W
Section 17
Section 20
Section 27
Section 28
Section 34

T13N R19W
Section 11
Section 13
Section 14
Section 24

The system's proposed whereabouts would severely undermine the potential of the above-described development and is most unsatisfactory. Aesthetically, the system as proposed would be an eyesore making residential development most undesirable. Such a system located as outlined would inhibit communication reception, airport planning as an airport is proposed in this project, and the location there of certain commercial enterprises. As the State of Arizona would be participating in this development with the Corporation, such action would detrimentally affect the State and particularly its School Trust, which this development would serve to enhance. At a time when national and state economic conditions are uncertain, we suggest that creating additional problems as these proposed is not in the best interests of the county, state or the nation. We trust that when this route was originally proposed, your offices did not have knowledge of this planned community and ask that you reconsider the location and nature of the system in light of the Corporation's actively sought plans for development.

The Corporation has additional interests in property north of the projected development including T16-1/2N, R20-1/2W, Section 36 and T16N, R20W, Section 32, the latter of which is owned by the Corporation outright in fee simple. The fee land will eventually, under present plans, be used for residential development. To extend the transmission system over this property is most inappropriate in that this privately owned section is surrounded on all sides by federal land where the system should more properly be placed. The objections stated with reference to the planned community development would apply here as well.

It would appear that the entire valley southwest of Crossman Peak is suitable for planned community residential development and that it would be to the best interests of all concerned to relocate the route of the system north and east from said point located at T14N, R18W at approximately Sections 17 thru 13 going east. In light of these imminent development plans, the Bureau might consider placing the system underground which would help to avoid the problems discussed above.

We also question and respectfully object to the procedural manner pursuant to which the matter has been discussed and otherwise handled to date. To schedule one hearing on such an important matter affecting the overall commercial and economic future of the area during the Christmas holidays, at a time inconvenient to most, was in our opinion, most inappropriate, and violative of due process and federal procedural requirements. In this regard, we formally object to the Corporation not being given formal written notice of the hearing particularly in light of its extensive holdings and plans for development in the area.

We request the opportunity to be heard personally before a final decision is made on the location and nature of the Granite Reef Aqueduct Transmission System.

With best regards, I remain

Very truly yours,

SNOWBERGER & LARSON

Wallace L

Wallace L. Larson

WLL:se

T 14 N R 19 W

Section 17 all

Section 20 all

Section 28 E 1/2, S 1/2 NW, SW

Section 18 lots 1-4, E 1/2 W 1/2, E 1/2

Section 19 lots 1-4, E 1/2 W 1/2, E 1/2

Section 29 S 1/2 NE, SE

Section 32 N 1/2, SW, N 1/2 SE, N 1/2 S 1/2 SE

Section 27 W 1/2

Section 34 W 1/2

T 14 N R 20 W

Section 24 N 1/2, E 1/2 SE

Section 16 all

Section 13 N 1/2, E 1/2 SW, N 1/2 NWSW, SE

Section 23 all

Section 25 N 1/2

Section 26 N 1/2 NE, N 1/2 NW, N 1/2 SWNW, SW SWNW,
N 1/2 SE SW NW, W 1/2 SW SE SWNW, NWSENW

Section 27 NW

Section 14 lots 1, 2 S 1/2 NE, W 1/2, N 1/2 N 1/2 SE

Section 22 all

Section 24 SW, W 1/2 SE

Section 17 all

T 13 N R 19 W

Section 10 all

Section 12 SWNW, S 1/2

Section 3 lots 1-4, S 1/2 N 1/2, S 1/2

Section 4 lots 1-4 S 1/2 NW, SW, S 1/2 NE, SE

Section 11 S 1/2

Section 13 all

Section 15 all

EXHIBIT A

Section 22 lots 1,3,6,8, N 1/2, N 1/2 SE, SESE

Section 23 all

Section 10 E 1/2

Section 14 all

Section 24 all

T 13 N R 18 W

Section 8 SWSE

Section 32 all

T 12 N R 19 W

Section 3 SE

Section 11 S 1/2

T 12 N R 18 W

Section 2 lots 3, 4 Excepting and Reserving Unto The United States Rights of Way for Ditches and Canals Constructed by Their Authority, and Subject to any Existing Easements or Rights of Way of Record.

T 16 N R 20 W

Section 32 all

T 16 N R 20 1/2 W

Section 2 lots 1-4, S 1/2 N 1/2, S 1/2

T 16 N R 21 W

Section 36 SE, E 1/2 SW, N 1/2 less R. W., SW SW

T 16 N R 21 W

Section 2 lots 1-4, S 1/2 N 1/2, S 1/2

T 16 N R 20 W

EXHIBIT A

Section 36 all less R. W.

T 15 N R 20 1/2 W

Section 36 E 1/2

T 14 N R 20 W

Section 17 all

T 30 N R 18 W

Section 27 NW

EXHIBIT A

Replies to Comments Made by Wallace L. Larson for Havasu Heights Ranch and Development Corporation (Letter of December 31, 1974)

1. Comment: Havasu Heights Ranch and Development Corporation has holdings covering nearly 20,000 acres in Mohave County, Arizona, and attached hereto marked as Exhibit A. and incorporated by reference into this correspondence as Exhibit A. is a list of legal descriptions of said property. The Corporation has owned some of the land and held Federal and State leases on this property contiguous to and surrounding Lake Havasu City, Mohave County, Arizona, for over the last ten years. Based upon the proposed route set forth in Figure 4 of the "Draft Environmental Statement", the system would traverse these holdings to the detriment of not only our client but the overall economic growth of Mohave County, Arizona.

   Reply: The State lands included in Exhibit A have been leased for repetitive 2-year periods. The draft environmental statement was also distributed to the Arizona State Clearinghouse for review by State agencies, the Regional Clearinghouse, Arizona State Land Department, Mohave County Planning Commission, and Mohave County Board of Supervisors. The alinement in this area has been modified from that shown as proposed in Figure 4 to alinement shown as alternative "A" on Figure 55 of the draft statement. This change in alinement has the concurrence of the Arizona State Land Department and is in keeping with the alinement change suggested by that Department. No comments have been received from Mohave County agencies or officials expressing concern about the alinement or hypothetical adverse economic impact.

2. Comment: Presently, the Corporation has imminent plans to develop on approximately 15,200 acres presently leased commercially to the Corporation by the State of Arizona a planned community development consisting of residential, commercial, light industrial, civic, park and recreational development. A report entitled "Land Transference in Mohave County - Study and Proposal" is on file with the Arizona State Land Department and is being actively considered by the State presently. This report was prepared at the Corporation's request by the internationally renowned architectural firm Perry, Dean & Stewart, which has offices in Boston, Massachusetts, and computer-aided design centers in Washington, D.C. and Phoenix, Arizona. An expression of interest in Colorado River water, as prepared by our clients and their advisors, is on file with the Arizona Water Commission for nearly 4 billion gallons of water eventually

to be used to service a projected population in the planned community of nearly 50,000 residents by the year 2000. A leading American hotel corporation, which operates internationally, has expressed interest in locating a major facility within the proposed development. Also, a prominent pharmaceutical company has expressed similar interest.

Reply: The report on the planned community was submitted to the Arizona State Land Department on December 3, 1974. The expression of interest in Colorado River water was submitted to the Arizona Water Commission in December 1974. No recommendation by the Arizona Water Commission has been made to the Secretary of the Interior with respect to the Corporation becoming a contracting entity for Colorado River water. Reference is also made to the Arizona Water Commission letter of December 27, 1974 to the Bureau of Reclamation.

Prior to the initiation of the preparation of the draft environmental statement, the State Clearinghouse and the notified State agencies and regional clearinghouses and their coordinating governmental units had been notified that the preparation of an environmental statement for the transmission system was in progress. Section II.J.3.d. of this statement indicates that even with prior coordination with the Arizona State Land Department and other State and local government units, the Corporation's plans were not sufficiently disclosed for coordination efforts to be effective.

3. Comment: The system's proposed whereabouts would severely undermine the potential of the above-described development and is most unsatisfactory. Aesthetically the system as proposed would be an eyesore making residential development most undesirable. Such a system located as outlined would inhibit communication reception, airport planning as an airport is proposed in this project, and the location there of certain commercial enterprises. As the State of Arizona would be participating in this development with the Corporation, such action would detrimentally affect the State and particularly its School Trust, which this development would serve to enhance. At a time when national and State economic conditions are uncertain, we suggest that creating additional problems as these proposed is not in the best interests of the county, State, or the Nation. We trust that when this route was originally proposed, your offices did not have knowledge of this planned community and ask that you reconsider the location and nature of the system in the light of the Corporation's actively sought plans for development.

Reply: The demand for further subdivision development in the Lake Havasu City area is questionable. Use of State lands is controlled and determined by the State Land Department.

4. Comment: The Corporation has additional interests in property north of the projected development including T. 16-1/2 N., R. 20-1/2 W., Section 36 and T. 16 N., R. 20 W., Section 32, the latter of which is owned by the Corporation outright in fee simple. The fee land will eventually, under present plans, be used for residential development. To extend the transmission system over this property is most inappropriate in that this privately owned section is surrounded on all sides by Federal land where the system should more properly be placed. The objections stated with reference to the planned community development would apply here as well.

Reply: The existing Davis-Parker No. 1 transmission line crosses a corner of each of the above described parcels. The proposed Davis-Parker No. 2 transmission line will parallel to the east the existing line. **Twelve and six-tenths acres of fee land will be acquired. The certainty of subdivision development as stated appears extremely premature** in the absence of a demonstrated water supply and a need for more subdivision development.

5. Comment: It would appear that the entire valley southwest of Crossman Peak is suitable for planned community residential development and that it would be to the best interests of all concerned to relocate the route of the system north and east from said point located at T. 14 N., R. 28 W. at approximately Sections 17 through 13 going east. In light of these imminent development plans, the Bureau might consider placing the system underground which would help to avoid the problems discussed above.

Reply: With respect to placing high voltage lines underground, reference is made to Section VIII.D.1.a.

6. Comment: We also question and respectfully object to the procedural manner pursuant to which the matter has been discussed and otherwise handled to date. To schedule one hearing on such an important matter affecting the overall commercial and economic future of the area during the Christmas holidays, at a time inconvenient to most, was in our opinion, most inappropriate, and violative of due process and Federal procedural requirements. In this regard, we formally object to the Corporation not being given formal written notice of the hearing particularly in light of

its extensive holdings and plans for development in the area.

Reply: The procedure followed is in accord with notices published in the Federal Register regarding availability of the draft statement and the date of the public hearing. Additional publicity given to the statement in the local press and by the broadcasting media is also noted in Section IX.A.4, IX.B, and IX.C. of the draft statement and corresponding sections of this final environmental statement. The location of the hearing site was based on the proximity to the work area, with particular regard to available public facilities and immediacy of scheduled construction adjacent to Lake Havasu City.

7. Comment: We request the opportunity to be heard personally before a final decision is made on the location and nature of the Granite Reef Aqueduct Transmission System.

Reply: Legal and architectural representatives of the Corporation were present at a meeting on February 18, 1975, with the Arizona State Land Department, and the Bureau of Reclamation to discuss modifications of routings and changes in alinements to those shown in this final environmental statement. The State Land Department reserves the right to modify terms of land leases and to grant rights-of-way across leased State lands. Mr. Larson has been informed during telephone conversations of alinement changes considered at the request of the State Land Department and the Bureau of Land Management.

JACK WILLIAMS
GOVERNOR

Arizona
State Land Department
1624 WEST ADAMS
PHOENIX, ARIZONA 85007
602-271-4634

ANDREW L. BETTWY
STATE LAND COMMISSIONER

— 720
CAP

December 31, 1974

1975
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210
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150
Inf. copy

Mr. C. A. Pugh, Project Manager
U. S. Department of the Interior
Bureau of Reclamation
Arizona Projects Office
Lower Colorado Region
135 North Second Avenue
Phoenix, Arizona 85003

Re: Davis-Parker 230 KV Transmission Line

Dear Mr. Pugh:

Our own preliminary assessments indicate modifications in the Transmission Line alignment north of Lake Havasu City and resulting impact on State Trust land can be reduced.

May we suggest an alignment through Sections 10, 11 and 12, T14N, R20W, and Sections 7 and 8, T14N, R19W, rather than the proposed alignment 13, 14, 15, T14N, R20W and Section 18, T14N, R19W.

Your proposed alignment may result in an inappropriate fracturing of State Trust lands for future development and may violate the intent of having selected these lands for a high use.

Sincerely yours,

Kelly R. Johnson

Kelly R. Johnson, Administrator
Office of Natural Resource Conservation

KRJ:et

Reply to Comments Made by the
Arizona State Land Department
Phoenix, Arizona
(Letter of December 31, 1974)

1. Comment: Our own preliminary assessments indicate modifications in the Transmission Line alignment north of Lake Havasu City and resulting impact on State Trust land can be reduced.

May we suggest an alignment through Sections 10, 11 and 12, T14N, R20W, and Sections 7 and 8, T14N, R19W, rather than the proposed alignment 13, 14, 15, T14N, R20W and Section 18, T14N, R19W.

Your proposed alignment may result in an inappropriate fracturing of State Trust lands for future development and may violate the intent of having selected these lands for a high use.

Reply: The alinement in the area of T. 14 N., R. 19 and 20 W., has been changed as described in Chapter I and as shown on Figure 4. The change in alinement has moved the line further north and east to the alinement that was shown as Alternative "A" on Figure 55 of the draft environmental statement. This alinement change was made after consultation and coordination with the Arizona State Land Department, Bureau of Land Management, Citizens Utilities Company, and community leaders in Lake Havasu City. The Arizona State Land Department has the jurisdiction and responsibility for all modification of lease terms on State of Arizona lands leased to individuals or corporations. The Department is also the sole agent to grant rights-of-way across State lands and reserves this right in its contracts with lessees of State lands.

United States Department of the Interior

BUREAU OF OUTDOOR RECREATION
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

DES-74/105
20

CENTRAL ARIZONA PROJECT

CE 6AC

Memorandum

To: Commissioner of Reclamation

From: Acting / Assistant Director, Bureau of Outdoor Recreation

Subject: Review of Draft Environmental Statement for the Granite Reef Aqueduct Transmission System, Central Arizona Project, Arizona-New Mexico

We have reviewed the subject draft environmental impact statement as requested in your memorandum of November 15, 1974.

General Comments

On the basis of information included in the draft, there appear to be no conflicts with this Bureau's Legacy of Parks program nor with projects funded with Land and Water Conservation monies. The major impact of the project on recreation would be seem to be the visual impact of the transmission facilities. We recognize that much of the project will be within an existing power line corridor.

We do feel that the final statement should include a detailed, quantified, discussion of existing and planned recreation facilities on the route and the proposed project's impact thereon.

Specific Comments

On page 14 the draft EIS indicates that the publication Environmental Criteria for Electric Transmission Systems published by the U. S. Departments of the Interior and Agriculture was used as a guide for systems design. This guide (page 7) suggests that where a transmission line crosses a park, recreation area, etc., it should be placed underground, if feasible. The draft environmental statement does not indicate whether undergrounding is feasible at Lake Mead National Recreation Area or at Havasu Lake Park. We believe such a statement should be made in the section of the EIS which discusses recreation.

Replies to Comments Made by
Bureau of Outdoor Recreation
Washington, D.C.
(Memorandum of December 31, 1974)

1. Comment: We do feel that the final statement should include a detailed, quantified, discussion of existing and planned recreation facilities on the route and the proposed project's impact thereon.

Reply: Agencies with identified or identifiable program elements for recreation that are in existence or planned along the route are the Bureau of Land Management for lands along the Colorado River withdrawn for Reclamation purposes, lands in BLM management units which have not had lands previously withdrawn for transmission line corridor purposes along this system routing, the National Park Service and the Arizona State Parks Department. Within or adjacent to the existing or adjacent utility corridors which will be utilized there is less than 2 miles at the extreme southern end of the Lake Mead National Recreation Area within about 1/4 mile of the recreation area boundary and 2 miles where the alinement is right along the southern area boundary where the alinement leaves the existing adjacent 500-kV Eldorado-Mohave line. From the transmission line location and recreation area boundaries shown on the drawings in the report the length of line has been quantified by the data included in Table 5, Section I.E.2. The total length of 6 miles involving specific recreation area designation lands is comprised of 2 miles on Federal lands and 4 miles of Arizona State Park lands leased from the Bureau of Land Management for recreation purposes. The recreational use component of multiple-purpose rangelands would appear to experience a very tenuous incremental impact at most. The roadwork network presently used for recreation access will continue to be available for use within the areas of multiple use management. Areas that may be closed to general public access by the primary land management agency in the future (by either, BLM, or the State Land Department) are not possible of determination at this time.

2. Comment: Specific Comments
On page 14 the draft EIS indicates that the publication Environmental Criteria for Electric Transmission Systems published by the U.S. Departments of the Interior and Agriculture was used as a guide for systems design. This guide (page 7) suggests that where a transmission line crosses a park, recreation area, etc., it should be placed

underground, if feasible. The draft environmental statement does not indicate whether undergrounding is feasible at Lake Mead National Recreation Area or at Havasu Lake Park. We believe such a statement should be made in the section of the EIS which discusses recreation.

Reply: Section VIII.D.1.a. has been expanded to indicate the problems and costs encountered in the underground construction of high voltage transmission lines and indicates that this subject has been presented in greater detail in earlier environmental statements. The referenced document is considered a guide only to practices in areas with a general connotation of high population densities. In examining routing feasibilities, the designation as a "park, recreation area, etc.," of land generally vacant due to the absence of basic necessities or amenities to establish or support a viable community is not in most instances construed in the same sense as a similar designation in a metropolitan setting. This is more apparent with examination of Figure 3. Additionally, the selection for undergrounding of a line on a rule or regulation basis would require documentation under Executive Order No. 11821.

March 3, 1849

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

State Office
3022 Federal Building
Phoenix, Arizona 85025

IN REPLY RE

1792 (911)
Your reference:

6-D

CENTRAL ARIZONA PROJECT

December 31, 1974

Memorandum

To : Commissioner of Reclamation, Washington, D.

From : State Director, Arizona State Office, Bureau of Land Management

Subject: Review of Draft Environmental Statement for the Granite Reef Aqueduct Transmission System (Central Arizona Project)

We have reviewed the Statement as requested and offer the following comments.

The Statement raises some broad questions about southwest transmission systems in general. There is a recurring reference to a "Federal Transmission System." Other systems do not appear to be considered, either as a primary or alternate system. For example, the proposed Palo Verde Nuclear Generating Station (PVNGS) is projected to be producing power about the same time CAP will be in operation. The relationship between PVNGS and the CAP system is not made clear. There is no description of other existing and proposed power plants and transmission systems. It would appear that the "Federal System" and the "Private Systems" should be juxtaposed so that the total environmental impacts of transmission systems can be minimized.

The proliferation of new proposals for transmission lines and corridors does not appear to be well coordinated.

The transmission line, as originally proposed, would circumvent Lake Havasu City to the east, proceed southward and approach Highway 95 at an acute angle, thereby being very apparent from the highway for several miles, and eventually would cross the highway through Standard Wash, where it would also be plainly visible for a considerable distance. It is our understanding that the proposed route has been changed so that the line would make a sharper right turn in Sec. 2, T. 13 N., R. 26 E., resulting in a much more direct approach to Highway 95, rendering the line visible from the road for a much shorter distance than in the original plan.

Our Havasu Office has expressed concern that because of inability to coordinate planning with Citizens Utilities Company, the route that is presently being staked by Reclamation is not as shown in the draft environmental statement but rather is as shown as Alternate Route "A" on Figure 56 of the environmental statement. This will result in the construction of a transmission line in an area previously without power lines and preclude the possibility of a substation in Sec. 15, T. 14 N., R. 25 E. It will also eventually require the construction of another 230 kv transmission line by Citizens Utilities Company from Davis Dam to Lake Havasu City paralleling the two that will exist by then. The duplication of effort will necessarily result in a duplication of environmental consequences. Further coordination between Reclamation and CUC is strongly encouraged.

The following specific comments and suggestions are listed for your consideration and may require more clarification:

p. 10. Apparently one major justification for the proposed system is for an intertie between the Pacific Northwest and the Southwest. The need for this intertie should be made clearer.

p. 12. The first paragraph could be clarified by using a chart or altering the maps by including mileage segments. It is not made clear whether a "low profile" substation will be constructed at Harcuvar. Fig. 12A indicates it may be used.

pp. 24; 200. Free standing towers are selected over guyed delta towers. The reason for non-selection of guyed delta towers in this statement is similar to the reason for selection for the Westwing-Vail line. This conflict raises some questions about the validity of criteria for selection of towers.

p. 27. The Havasu Substation does not appear on the maps.

p. 30. Power to the majority of check stations will be by buried cable. These should be quantified and shown on a map for clarity.

p. 37. The statement indicates a wider right-of-way width is needed for a 230 kv single circuit line than for a 230 kv/115 kv double circuit line. This appears to be in error.

pp. 44; 139. There are no programs of revegetation and road eradication proposed for the access roads not needed for maintenance after construction activities.

p. 71; Appendix C. The reference to FWS March 1973 edition of Threatened Wildlife of the United States should be updated to the FWS May 1974 edition of United States List of Endangered Fauna. The 1973 Endangered Species Act no longer has a "status undetermined" category.

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p. 139. More detail on the type and duration of environmental education of construction and inspection forces should be included.

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p. C-18. The scientific name of Alfileria should be Erodium cicutarium.

p. D-1. Definition of Check Structure is unclear, especially the last three words.

p. D-9. Definition of carnivor should be: "Any chiefly flesh eating mammal of the order Carnivora."

cc:
WO BLM (220)

Replies to Comments Made by the Bureau of Land Management Arizona State Office Phoenix, Arizona (Memorandum of December 31, 1974)

1. Comment: The Statement raises some broad questions about southwest transmission systemsin general. There is a recurring reference to a "Federal Transmission System." Other systems do not appear to be considered, either as a primary or alternate system. For example, the proposed Palo Verde Nuclear Generating Station (PVNGS) is projected to be producing power about the same time CAP will be in operation. The relationship between PVNGS and the CAP system is not made clear. There is no description of other existing and proposed power plants and transmission systems. It would appear that the "Federal System" and the "Private Systems" should be juxtaposed so that the total environmental impacts of transmission systems can be minimized.

   Reply: Reference is made to Section I.G. and IX.A., IX.A.1, and Figure 37 on which the "Federal System" originating from Reclamation hydroelectric plants is shown in red, and the Bureau of Indian Affairs systems are shown in black. The descriptions of other systems existing and proposed is included by reference to the many voluminous documents and Federal environmental statements already filed including FES 75-7. The juxtaposition of further new private or Federal lines adjacent to existing private or Federal lines will be an incremental effect. The utilization of existing corridors appears to be the intent of the Congress in P.L. 93-153, Sections (p) and (s). With a delivery point fixed in location by the pumping plants of the aqueduct system, the supply point fixed by the Navajo Generating Station, the constructed transmission lines from the Page Powerplant to McCullough Switching Station, and Westwing Substation, and a use commitment for a minimum period of 50 years, all of which has been described in prior environmental statements, repetition of material would be redundant and nonproductive especially in light of the Southwest Energy Study.

2. Comment: The proliferation of new proposals for transmission lines and corridors does not appear to be well coordinated.

   Reply: The Western Systems Coordinating Council (WSCC) is a formal coordinating organization of which the Bureau of Reclamation is a member. The Arizona Powerplant and Transmission Line Siting Committee composed of 18 members from public, governmental agencies, alongwith a professional landscape architect were notified for information and coordinating purposes. The problem of a proliferation of new proposals for transmission lines is recognized. We understnad that BLM is studying this problem under authorization contained in P.L. 93-153, The Trans-Alaska Pipeline Authorization Act. The cooperative efforts of BLM are anticipated by Reclamation as the lead agency for the preparation of the environmental statement for the Coronado Steamplant, coal mine expansion, transportation system and transmission system.

3. Comment: The transmission line, as originally proposed, would circumvent Lake Havasu City to the west, proceed southward and approach Highway 95 at an acute angle, thereby being very apparent from the highway for several miles, and eventually would cross the highway through Standard Wash, where it would also be plainly visible for a considerable distance. It is our understanding that the proposed route has been changed so that the line would make a sharper right turn in Section 2, T. 13 N., R. 26 E., resulting in a much more direct approach to Highway 95, rendering the line visible from the road for a much shorter distance than in the original plan.

Reply: The revised routing described above has been adopted as the routing described in the final statement and shown on the appropriate figures. The drawing base sheets have been clarified so the difference between the Gila and Salt River Base and Meridian applicable to Arizona (Sec. 2, T. 13 N.) is not confused with the San Bernardino Base and Meridian which is referred to by the "R. 26 E." above.

4. Comment: Our Havasu Office has expressed concern that because of inability to coordinate planning with Citizens Utilities Company, the route that is presently being staked by Reclamation is not as shown in the draft environmental statement but rather is as shown as Alternate Route "A" on Figure 56 of the environmental statement. This will result in the construction of a transmission line in an area previously without power lines and preclude the possibility of a substation in Sec. 15, T. 14 N., R. 25 E. It will also eventually require the construction of another 230-kV transmission line by Citizens Utilities Company from Davis Dam to Lake Havasu City paralleling the two that will exist by then. The duplication of effort will necessarily result in a duplication of environmental consequences. Further coordination between Reclamation and CUC is strongly encouraged.

Reply: The drawings have been clarified so the Range location is not confused between R. 20 W., G&SRBM, and R. 25 E., SBM. The concern of the local residents to secure additional power to assist in the growth of the community of Lake Havasu City has been addressed in Section IX.C in relation to the public hearings. The appropriate agency through which action by the local citizens should be sought is the authority granting franchise area certificates for service. Reference is made to the previously proposed Citizens Utilities Company's substation while possibly beneficial from several aspects, the ultimate decision for obtaining a power supply for the CUC System rests with that company. With planned construction of future generating stations in the vicinity of Vidal Junction and Blythe, the company may have longer term plans which have not been disclosed from that of assuming another 230-kV line from Davis Dam. The present CUC 69-kV line to Lake Havasu City originates at the Parker Switchyard as is shown on Figure 37, previously referred to. The future upgrading of this line should not be dismissed out of hand. The subsequent construction of additional lines in an existing corridor is accompanied by incremental impacts which are less than that of two or more separated lines. Finally, under possible wheeling arrangements it is possible that a tap for the substation could initially be made from the Davis-Parker No. 1 Line and any tap could be made to the No. 2 line after its completion.

Reclamation will continue to coordinate with CUC on their plans for a substation at Lake Havasu City.

5. Comment: The following specific comments and suggestions are listed for your consideration and may require more clarification.

p. 10. Apparently one major justification for the proposed system is for an intertie between the Pacific Northwest and the Southwest. The need for this intertie should be made clearer.

Reply: This comment assumes more emphasis on the immediacy of the deferred Pacific Northwest-Pacific Southwest Intertie than are discernible to Reclamation. The primary purpose as stated is for the Central Arizona Project as stated. Future possible joint use benefits are displayed for impact and comprehensiveness of planning consideration for long-term conditions that are not apparent in known programs and related budget policies. While there may be an ultimate utilization of the system in conjunction with the intertie, this may be incidental to increasing capacity along other existing corridors such as the Mead-Liberty

345-kV line which was constructed specifically under the intertie program.

6. Comment: p. 12. The first paragraph could be clarified by using a chart or altering the maps by including mileage segments. It is not made clear whether a "low profile" substation will be constructed at Harcuvar. Fig. 12A indicates it may be used.

Reply: Tables 1 and 2 on the preceding page presented the mileage segments which are further broken down by land status in Table 5 (Section I.E.3.), Section I.D.3.c.(5). (on page 23 of the DES) specifically states, "The structures and equipment will be of the low profile design, such as shown in Figure 12A...." This is Figure 13 of this statement.

7. Comment: pp. 24; 200. Free standing towers are selected over guyed delta towers. The reason for nonselection of guyed delta towers in this statement is similar to the reason for selection for the Westwing-Vail line. This conflict raises some questions about the validity of criteria for selection of towers.

Reply: The Westwing-Vail line is the first line to be constructed along this route. A guyed delta tower requires a somewhat wider right-of-way per line than a free standing tower. The existing lines that are being paralleled are of latticed tower design. For compatibility of design the lattice design is being held to. The guyed delta tower may require a slightly less weight of steel. The combined weight of cumulative corridor right-of-way widths for multiple lines, design compatibility, and a slightly greater weight given to tower and line security may be evaluated by nonoperating agency reviewers as an inconsistency in validity of design selection. Additional reply is made to a similar comment by the Forest Service.

8. Comment: The Havasu Substation does not appear on the maps.

Reply: The tentative nature of the proposed CUC Lake Havasu City Substation precluded the addition of this item to a specific system presentation.

9. Comment: Power to the majority of check stations will be by buried cable. These should be quantified and shown on a map for clarity.

Reply: Reference is made to FES 74-3 on the Granite Reef Aqueduct. Until the aqueduct prism and pumping plants and supervisor control system are specifically designed an attempt to more definitively locate the check structures would be misleading. The final location of the check structures will have no environmental impact not already addressed by FES 74-3.

10. Comment: p. 37. The statement indicates a wider right-of-way width is needed for a 230-kV single circuit line than for a 230-kV/115-kV double circuit line. This appears to be in error.

Reply: Table 4 which shows the right-of-way width associated with lines of 115-kV and 230-kV of single or double circuit should compare the ruling span and the tower design illustrations shown by Figures 15, 25, 26, 27, 28, 29, 30, 34, 35, 62, and 63. The greater distance of 50 feet between outside conductors in Figure 15 for a single circuit line contrasts with 35 feet between the outside conductors in Figure 25. The conductor spacing and ruling span provide the basic criteria used to derive the right-of-way width as shown.

11. Comment: pp. 44; 139. There are no programs of revegetation and road eradication proposed for the access roads not needed for maintenance after construction activities.

Reply: The area traversed by this system is even more arid than the route of the Westwing to El Sol to Vail line statement prepared by Bureau of Land Management in which they responded to a similar comment on page 214 and 214a of FES 75-7. The futility of attempting to revegetate areas with insufficient rainfall is well known to the Bureau of Land Management without recourse to extensive range water spreading structures which would require an appreciably greater area of right-of-way or control than for the line corridor. Section IV.B.2 contains a specific sentence "Roads not required for maintenance access will be scarified to encourage natural regrowth."

12. Comment: p. 71; Appendix C. The reference to FWS March 1973 edition of Threatened Wildlife of the United States should be updated to the FWS May 1974 edition of United States List of Endangered Fauna. The 1973 Endangered Species Act no longer has a "status undetermined" category.

Reply: The 1974 document entitled U.S. List of Endangered Fauna states, "The endangered species list as set forth below merely combines the "Native" and "Foreign" lists as published in the January 4, 1974 issue of the Federal

Register (Vol. 39, No. 3) under the authority of the old Act (Endangered Species Conservation Act of 1969). All species previously listed are deemed to be "Endangered Species" until such time as the list can be restructured and expanded into the two lists designated by the 1973 Act."

Since an environmental impact statement is a full disclosure document, it is Reclamation's opinion that we have a responsibility to relate to the public the status of all species that might be affected by the project under consideration. The designation of Status Undetermined in Threatened Wildlife of the United States is an indication by the Fish and Wildlife Service that some caution should be used when the habitat of such a species might be disturbed. Accordingly, we felt obligated to indicate that these species had been so designated.

13. Comment: p. 92. The statement, "the researchers believe these sites will add little or no new information to the study of the archeology of the area," is difficult to accept without additional supportive data. Reports or statements from "the researchers" supporting this conclusion should be included in the Appendix.

Reply: Sections II.L, III.B.2.c., IV.C.3., and VI. and Table C-7 have been augmented by extractions from the reports obtained through coordination with the Arizona Archeological Center.

14. Comment: p. 94 (and later). The term "unquantified impacts" is used. Perhaps this term should be changed to "unknown impacts" to provide a clearer connotation.

Reply: Within the triparte definition, "unknown" is included. The use of this triparte definition reduces the total need of impact classifications from five categories to three and includes some possible impacts which fall into philosophical, theoretical, hypothetical, or problematical categories. Additionally the requirements of NEPA identify a need to discuss unquantified impacts.

15. Comment: p. 106. The "controlled conditions" referred to for excavation of aggregates are not made clear.

Reply: Specification requirements for concrete aggregate production leave a depressed excavated area that is not required to be backfilled because the backfill would create another excavation area. The area is required to be left in a condition free of debris and trash. It may contain fines produced from aggregate washing with the location of the fines controlled to prevent water quality deterioration. Steep banks may also be required to be sloped to minimize erosion rilling. Aggregate sources taken from Federal lands will require permission of BLM, and conformance with any mitigation concepts that agency may incorporate into its permit procedures.

16. Comment: pp. 115; 141; 148. There should be other protective considerations for the colony of great blue herons other than not permitting construction during nesting season. There may be a danger of herons colliding with the towers of the powerlines. If so, this should be mitigated.

Reply: There is virtually no danger of herons colliding with towers or power lines. At any rate, losses of this type are generally considered to be part of the population's natural mortality rate. The important factor when considering population status is the success or failure of its reproductive effort. Limitations on construction activities during the nesting season will minimize the potential adverse affects on the reproduction of great blue herons.

17. Comment: pp. 117; 142. The length of time required for the aging process to reduce the reflective quality of the metallic member should be given. Construction with a nonspecular finish should be considered if considerable length of time is required for the aging process.

Reply: The report has been reviewed for locations where this comment regarding reflective conductor materials would provide a pertinent and informative addition. An evaluation of nonspecular conductors has been initiated and the initial conclusions have been that there would be no advantage gained in using this type of conductor. The reflective characteristics as emphasized by Figure 32 vary with the light intensity, seasonal, and daily orientation of the rays, and the surface condition of the conductor which is related to age of the line, and the conductor composition. Refer to the reply to the Forest Service comments on the same item.

The industry standard of Aluminum Cable Steel Reinforced (ACSR) has a more rapid oxidation rate and surface color change than copper which has not been used for new installation in practice for many years.

18. Comment: pp. 119; 134. Direct impacts of road construction point out that some degradation will occur as a result of new access road use. Perhaps there should be a discussion of the possible mitigation of these changes through road closure or obliteration.

Reply: The discussion in Section I.E.5. on access roads states, "after construction activities, the access roads will be repaired for maintenance use or, if not needed for maintenance, will be allowed to return to a natural state after obliteration." Most of the alinement is presently no further than 3 to 4 miles from an existing highway, road, or vehicle trail. Within the right-of-way, actual effectiveness of maintenance road closure in the absence of fencing is highly questionable in this area of public multiple use desert rangelands.

19. Comment: p. 120. Paragraph on "Aviation Obstruction Markers" is unclear. Obstruction markers may be a hazard to crop dusters.

Reply: This paragraph has been edited.

20. Comment: p. 139. More detail on the type and duration of environmental education of construction and inspection forces should be included.

Reply: Section IV.B.1. has been reviewed. Reclamation's environmental orientation program is similar to its safety program in having the interest and support of top management emphasized down through the supervisory and production levels. Additionally, the participation of the wide range of personnel in developing data for preparing segments of environmental statements gives them on-the-job experience with specific facts which require particular attention.

21. Comment: p. 144. The 19-mile bypass around Lake Havasu City may be environmentally advantageous but it should be expanded to justify a new 19-mile corridor. Consideration should be given to moving the existing Bureau of Reclamation line to capitalize on the mitigating advantage.

Reply: In accord with established policy, the environmental description, impact and commitments for mitigation are informational and not a justification statement. Consideration of moving the existing line of the Parker-Davis Project would entail authorization by Congress for a program of modifying an existing operating project which is not a part of the authorized Central Arizona Project. Hence relocation of this existing line cannot be considered a direct relationship to the CAP project. Thus it cannot be considered an alternative measure.

22. Comment: p. 157 (and later). Other sources of alternate power such as PVNGS should be considered.

Reply: This may be a theoretical alternative but it is not a practicable one under the conditions of project authorization for contracting for capacity in the Navajo Power Project which is rapidly approaching the completion stage with Unit No. 1 having been on line for almost 1 year.

23. Comment: p. C-18. The scientific name of Alfileria should be Erodium cicutarium.

Reply: This typographical correction has been made.

24. Comment: p. D-1. Definition of Check Structure is unclear, especially the last three words.

Reply: This definition has been clarified.

25. Comment: p. D-9. Definition of carnivor (sic) should be: "Any chiefly flesh-eating mammal of the order Carnivora."

Reply: The term carnivore applies to all organisms that eat predominately animal flesh, not just to mammals. To clarify this, the definition has been changed to: Any animal or plant whose primary food source is animal flesh.

Department of Water and Power the City of Los Angeles

TOM BRADLEY
Mayor

Commission
BURTON J. GINDLER, *President*
MICHAEL GLAZER
GEORGE H. KENNEDY
PATRICIA C. NAGLE
HERBERT C. WARD
MARY J. BORN, *Secretary*

ROBERT V. PHILLIPS, *General Manager and Chief Engineer*
PAUL H. LANE, *Chief Engineer of Water Works and Assistant Manager*
JAMES L. MULLOY, *Chief Electrical Engineer and Assistant Manager*
WILLIAM D. SACHAU, *Chief Financial Officer*

January 6, 1975

Mr. E. A. Lundberg
Regional Director
U. S. Bureau of Reclamation
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

We have reviewed the Environmental Statement for the Granite Reef Aqueduct Transmission System which accompanied your letter of November 15, 1974.

On page 19 of the Environmental Statement it is declared that the McCullough Switching Station is owned and operated by the Los Angeles Department of Water and Power. The Navajo Project Agreement provides for allocation of ownership of McCullough to three participants: the Department of Water and Power, the Salt River Project for the use and benefit of the United States, and the Nevada Power Company.

When the McCullough-Mead 230 kv transmission line is constructed by the Bureau of Reclamation, termination equipment for the line will have to be installed at McCullough. This will change the percentage ownership of the participants in the McCullough Switching Station and will require negotiation of new ownership percentages for various components in that station.

Sincerely,

Melvin Frankel

MELVIN FRANKEL
Engineer of Environmental Coordination

111 North Hope Street, Los Angeles, California ☐ *Mailing address:* Box 111, Los Angeles 90051
Telephone: (213) 481-4211 *Cable address:* DEWAPOLA

Reply to Comment Made by the Department of Water and Power The City of Los Angeles Los Angeles, California (Letter of January 6, 1975)

1. Comment: On page 19 of the Environmental Statement it is declared that the McCullough Switching Station is owned and operated by the Los Angeles Department of Water and Power. The Navajo Project Agreement provides for allocation of ownership of McCullough to three participants: the Department of Water and Power, the Salt River Project for the use and benefit of the United States, and the Nevada Power Company.

   When the McCullough-Mead 230-kV transmission line is constructed by the Bureau of Reclamation, termination equipment for the line will have to be installed at McCullough. This will change the percentage ownership of the participants in the McCullough Switching Station and will require negotiation of new ownership percentages for various components in that station.

   Reply: Section I.D.3.c.(l) has been revised to recognize the ownership allocation percentage contractual arrangements.

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Washington, D. C. 20250

8420

JAN 6 1975

Mr. Gilbert G. Stamm, Commissioner
Bureau of Reclamation
U. S. DEPARTMENT OF THE INTERIOR
Washington, D. C. 20240

Dear Mr. Stamm:

The Office of the Secretary has asked the Forest Service to review the Draft Environmental Statement for the Granite Reef Aqueduct Transmission System, Central Arizona Project, Arizona-New Mexico.

This report covers only the transmission lines that are proposed in connection with the Granite Reef Aqueduct, and therefore, has no direct impact on lands administered by the Forest Service. We are aware that the decision was made some years ago to treat major components of the Central Arizona Project in separate impact statements. However, we found this treatment makes it somewhat harder to assess the transmission line proposal, especially as regards the need for the lines and other possible alternatives. We note, for instance, that there are apparently other transmission lines that will be needed in connection with other components of the Central Arizona Project.

Generally, it was found that the descriptions of the proposal, the section on the environment, and the probable impacts were adequate. We are particularly glad to see the consideration being given to uprating of older lines and the close paralleling of existing lines.

More specific comments on the environmental statement are enclosed.

We appreciate the opportunity to review and comment on this Statement.

Sincerely,

R. MAX PETERSON
Deputy Chief

Enclosure

FOREST SERVICE COMMENTS

Re: DRAFT ENVIRONMENTAL STATEMENT - GRANITE REEF AQUEDUCT
TRANSMISSION SYSTEM - Central Arizona Project

1. The text refers, in a couple of places, to letting the towers turn dull through weathering. You may want to consider treating the towers to darken the zinc coating, and use non-specular conductors in sensitive areas.

2. On page 200, the text indicates there are two types of guyed structures shown in Figure A. Our copy showed only one.

3. The text on the top of page 18 is almost identical to footnote #2 on the preceding page. Is that intentional?

4. You should consider rewording the Structures portion under Alternatives in the Design, starting on page 199. The discussion starts out as a defense of the type of towers proposed for use rather than a genuine presentation of alternatives. In addition, your reasons (1) and (2) for not using guyed towers are of questionable validity. In open country, guyed towers occupy the least ground. It is only in agricultural or built-up areas that the guys prevent activity such as farming. The guys are not so invisible as to be a hazard. The shackles and turnbuckles are at the bottom and are quite massive.

We are not suggesting that there would be any advantages from a visual standpoint to using a guyed tower on the proposed projects where you are paralleling older lines. However, guyed towers offer a great many environmental advantages in certain areas. In addition, one of the participants in the Kaiparowits Project proposes to use them for reasons of economy.

Your fourth reason is also now of doubtful validity. Since the Bureau of Reclamation had the trouble with vandals, we understand that methods have been devised to prevent loosening of the guys.

Your discussion of alternatives may be too narrowly limited to the Bureau of Reclamation constructed facilities. The statement only briefly alludes to other possibilities, such as wheeling arrangements, on page 158. With the construction of some of the other projects in the general area-like the Arizona Nuclear Project and the Desert and Palo Verde stations-it may be that there will be a great many other lines projected for the area. If that should prove to be the case perhaps the best alternative would be jointly owned larger transmission lines in order to reduce the numbers.

Replies to Comments Made by the Forest Service U. S. Department of Agriculture Washington, D.C. (Letter of January 6, 1975)

The general comment is that separate detailed impact statements during a period of years after the overall project impact statement makes it somewhat harder to assess subsequent information on features of the authorized project.

1. Comment: The text refers, in a couple of places, to letting the towers turn dull through weathering. You may want to consider treating the towers to darken the zinc coating, and use nonspecular conductors in sensitive areas.

   Reply: These possible treatments for towers and conductors are being examined and where applicable, supplemental information has been included in the final statement. The time period for these towers and conductors to turn dull is considered short so present plans do not include treating towers or using nonspecular conductors.

2. Comment: On page 200, the text indicates there are two types of guyed structures shown in Figure A. Our copy only showed one.

   Reply: The text has been edited to conform to the figure which was Figure 60-A in the draft and Figure 64 in the final statement.

3. Comment: The text on top of page 18 is almost identical to one footnote No. 2 on the preceding page. Is that intentional?

   Reply: Yes. The apparent repetition is intentional to avoid having some readers interpret the omission of the note on Table 3 as a failure to disclose information. The mention of this plant and the additional capacity was included in the final environmental statement on the Granite Reef Aqueduct FES 73-5.

4. Comment: You should consider rewording the Structures portion under Alternatives in the Design, starting on page 199. The discussion starts out as a defense of the type of towers proposed for use rather than a genuine presentation of alternatives. In addition, your reasons (1) and (2) for not using guyed towers are of questionable validity. In open country, guyed towers occupy the least ground. It is only in agricultural or built-up areas that the guys prevent activity such as farming.

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Reply: The types of transmission systems and the structural configuration of the conductor support with a statement as to the general practice of selection for land use or development areas is intended to be informational. In some instances reviewers respond to information differently. In using guyed towers, not only is the foundation area of the footing block involved but also the guy anchor block and the width of the rights-of-way. As future lines are required, an initial use of guyed towers will tend to restrict structural options requiring an accumulative effect of greater total rights-of-way area. Reasons (1) and (2) are professional interpretations of operating line experience. The reference to the Kaiparowits Project is similar to a comment by the Bureau of Land Management on the El Sol to Vail line. The aspect of system security is believed to be still valid in light of deliberate mischief, sabotage, or extortion. It is acknowledged that a concerted and determined effort by any group or individual could, in the long term, defeat the best security measures devised. An additional entry to Section VIII.D has been made to show the comparative rights-of-way widths required for tower alternative designs.

The reference to page 94 (Section VIII.A.) should be read in context with page 95, and Sections I.F., VIII.B.1., 2., and 3., IX.A., and Figure 37 (formerly Figure 61). This comment illustrates part of the complexity of coordination with regard to statement preparation in light of the several Federal impact statements by the Forest Service, Bureau of Land Management, Rural Electrification Administration, Atomic Energy Commission, and Bureau of Reclamation that have been issued or commenced since the preparation of this statement. Additionally, activities by several non-Federal entities are interrelated in the interconnected power systems as indicated by Table 9.

The last two sentences concerning further coordination to the extent of more detailed or intimate contractual coordination and participation with other utility systems and companies might require separate or additional congressional authorization. It is in part in keeping with the congressional policy indicated in Public Law 93-153, sections (p) and (s). The three names given may include the more recent designation of Palo-Verde Nuclear Generating Station (PVNGS) by the Arizona Public Service Company for what was previously referred to as the Arizona Nuclear Power Project (ANPP).

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

OFFICE OF THE DIRECTOR

DES 74-105

JAN 7 1975

Memorandum

To: Commissioner of Reclamation

Through: Deputy Assistant Secretary--Energy and Minerals JAN 14 1975

From: Director, Geological Survey

Subject: Review of draft environmental statement for the Granite Reef Aqueduct Transmission System, Central Arizona Project, Arizona-New Mexico

We have reviewed the subject draft environmental statement as you requested in a memorandum of November 15.

Although geologic conditions and possible geologic hazards appear to have been adequately considered with respect to the proposed project, no consideration has been given to the seismicity of this region, in which earthquakes causing moderate damage can reasonably be expected to occur. We suggest this subject be addressed in the impact statement.

We find that the statement adequately covers the impacts of the proposed project on water resources and related aspects of the environment.

Acting Director

Reply to Comment Made by the
U. S. Geological Survey
Reston, Virginia
(Memorandum dated January 7, 1975)

1. Comment: Although geologic conditions and possible geologic hazards appear to have been adequately considered with respect to the proposed project, no consideration has been given to the seismicity of this region, in which earthquakes causing moderate damage can reasonably be expected to occur. We suggest this subject be addressed in the impact statement.

Reply: During the process of editing from a field working draft to the preparation of the plate ready copy, the Section on Earthquake Hazard was inadvertently dropped from the manuscript. The omitted material has been replaced and is in this Final Statement as Section II.C.3.

Advisory Council
On Historic Preservation

620.

CENTRAL ARIZONA PROJECT

Mr. William F. Graham
Acting Assistant Commissioner
Bureau of Reclamation
U.S. Department of the Interior
Washington, D. C. 20240

JAN 7 1975

Dear Mr. Graham:

This is in response to your request of November 15, 1974 for comments on the draft environmental statement (DES) for Granite Reef Aqueduct Transmission System, Arizona, California and Nevada. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that while you have discussed the historical, architectural, and archeological aspects related to the undertaking, the Advisory Council needs additional information to adequately evaluate the effects on these cultural resources. Please furnish additional data indicating:

I. Compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470[f]). The Council must have evidence that the most recent listing of the National Register of Historic Places has been consulted (see Federal Register, February 19, 1974 and monthly supplements each first Tuesday thereafter) and that either of the following conditions is satisfied:

   A. If no National Register property is affected by the project, a section detailing this determination must appear in the environmental statement.

   B. If a National Register property is affected by the project, the environmental statement must contain an account of steps taken in compliance with Section 106 and a comprehensive discussion of the contemplated effects on the National Register property. (Procedures for compliance with Section 106 are detailed in the Federal Register of January 25, 1974.)

In addition, the Council notes on pages 92 and 116 of the DES that the Bureau of Reclamation arranged for a cultural survey within the area of the transmission system route location and that of the 27 prehistoric and historic sites identified, none were considered to be eligible for inclusion in the National Register of Historic Places. The Council also notes on page 92 that "The State Historic Preservation Officers for Nevada, Arizona and California will comment on the sites located on the alignment." The final environmental statement should contain the respective SHPO's comments, and an opinion of the Secretary of the Interior regarding the eligibility for inclusion in the National Register of the prehistoric and historic properties identified in the surveys.

Should you have questions or require additional assistance, please contact Michael H. Bureman of the Advisory Council staff at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946.

Sincerely yours,

John D McDermott

John D. McDermott
Director, Office of Review
and Compliance

Replies to Comments Made by the Advisory Council on Historic Preservation Washington, D.C. (Letter dated January 7, 1975)

1. Comment: I. Compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470(f)). The Council must have evidence that the most recent listing of the National Register of Historic Places has been consulted (see Federal Register, February 19, 1974, and monthly supplements each first Tuesday thereafter) and that either of the following conditions is satisfied.

   Reply: Section II.L. has been supplemented to indicate reference to the cited document.

2. Comment: If no National Register property is affected by the project, a section detailing this determination must appear in the environmental statement.

   Reply: Reference is made to Section II.L. that no site or property listed on the National Register is affected.

3. Comment: If a National Register property is affected by the project, the environmental statement must contain an account of steps taken in compliance with Section 106 and a comprehensive discussion of the contemplated effects on the National Register property. (Procedures for compliance with Section 106 are detailed in the Federal Register of January 25, 1974.)

   Reply: Reference is made to the preceding reply.

4. Comment: In addition, the Council notes on pages 92 and 116 of the DES that the Bureau of Reclamation arranged for a cultural survey within the area of the transmission system route location and that of the 27 prehistoric sites identified, none were considered to be eligible for inclusion in the National Register of Historic Places. The Council also notes on page 92 that "The State Historic Preservation Officers for Nevada, Arizona and California will comment on the sites located on the alignment." The final environmental statement should contain the respective SHPO's comments, and an opinion of the Secretary of the Interior regarding the eligibility for inclusion in the National Register of the prehistoric and historic properties identified in the surveys.

   Reply: Sections II.L. and III.B.2.c. and Table C-7 have been expanded to respond to this comment.

ARIZONA
STATE
PARKS
1688 West Adams
Phoenix, Arizona 85007
Telephone 271-4174
DENNIS McCARTHY, Director
WALLACE VEGORS, Assistant Director

Governor

STATE PARKS BOARD MEMBERS:
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Dennis McCarthy, State Historic Preservation Officer
State and National Registers of Historic Places

GRTS

JAN 31 1975

Mr. C. A. Pugh
Projects Manager
U.S. Department of the Interior
Bureau of Reclamation
Arizona Projects Office
Lower Colorado Region
135 North Second Avenue
Phoenix, Arizona 85003

Re: Granite Reef Aqueduct
Transmission System
Draft Environmental Statement

Dear Mr. Pugh:

There are no sites within the proposed Arizona segment of the right-of-way that are on the National Register of Historic Places or that are currently being considered for nomination to the National Register.

The archaeological reports have been reviewed. It is surprising that only two sites were located on the Liberty-Parker 230 kv Transmission Line, the Harcuvar-Little Harquahala 115 kv Pumping Plant Transmission Line, and the Harcuvar-Bause Hills 115 kv Pumping Plant Transmission Line surveys.

Sincerely,

DENNIS McCARTHY
State Parks Director

Dorothy Hall

Dorothy H. Hall
Historic Sites
Preservation Officer

DHH:oml
cc: Mike Buhrman
(ACHP Denver)

Reply to Comments Made by the
Arizona State Parks
Historic Sites Preservation Officer
Phoenix, Arizona
(Undated letter received January 3, 1975)

No reply to this letter is considered necessary.

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2711
LOS ANGELES, CALIFORNIA 90053

SPLED-E

10 January 1975

Mr. William F. Graham
Acting Assistant Commissioner
United States Department of the Interior
Bureau of Reclamation
Washington, D. C. 20240

Dear Mr. Graham:

This is in response to your letter of 15 November 1974 in which you requested Corps of Engineers comments on the draft environmental impact report for the Granite Reef Aqueduct Transmission System, Central Arizona Project.

The proposed plan does not conflict with existing or authorized plans of the Corps of Engineers. We have no comments concerning the environmental report for this proposed action.

Thank you for the opportunity to review and comment on this draft report.

Sincerely yours,

F. C. Nishihara
for
GARTH A. FUQUAY
Chief, Engineering Division

Reply to Comment Made by the
Department of the Army
Corps of Engineers
Los Angeles, California
(Letter dated January 10, 1975)

No reply to this letter is considered necessary.

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

Mr. Gilbert Stamm
Commissioner
Bureau of Reclamation
Department of the Interior

January 10, 1975

Dear Mr. Stamm:

This is in response to your letter of November 15, 1974, transmitting for our review and comment the draft environmental statement for the Granite Reef Aqueduct Transmission System. The statement covers the anticipated environmental impacts of about 333 miles of new electrical transmission lines which will supply power to pumping plants and check structures along the Granite Reef Aqueduct.

We have reviewed our previous comments which covered the entire Central Arizona Project (September 1971) as well as our comments on the Granite Reef Aqueduct (March 1973). Our previous comments centered around providing more information on potential erosion and revegetation problems. We feel this area of concern has been adequately accommodated in this statement.

The summary section states that the "principal impact of the proposed transmission line will be esthetic in nature." We suggest the statement would be strengthened if it included more information about the actual visual impact upon the desert landscape. Chapter III mentions the fact that various sections of the transmission lines will be visible from certain highways, but does not describe the associated visual impact upon the traveler.

For example, all the photographs are aerial views which do not necessarily illustrate the visual landscape as it will be seen by most humans. The visual skylining effect of the transmission line and the planned mitigation, needs to be discussed more fully. For example, the mitigation measure of topographic screening (p. 142) seems to be lacking in Figures 12, 19, 20, 44, etc.

We suggest you include a detailed discussion of the visual impact of the reflective aspect of the cables which are vividly illustrated in Figure 42. We assume nonspecular conductors will be used.

We appreciate the opportunity to review the draft environmental statement.

Sincerely,

Paul A. Vander Myde

PAUL A. VANDER MYDE
Deputy Assistant Secretary

Replies to Comments Made by the U.S. Department of Agriculture Washington, D.C. (Letter dated January 10, 1975)

Other comments from Department of Agriculture agencies were from the Rural Electrification Administration letter of December 4, 1974, which required no response, and the Forest Service's January 6, 1975, comments on behalf of the Department which have been replied to earlier in this appendix.

1. Comment: The summary section states that the "principal impact of the proposed transmission line will be esthetic in nature." We suggest the statement would be strengthened if it included more information about the actual visual impact upon the desert landscape. Chapter III mentions the fact that various sections of the transmission lines will be visible from certain highways, but does not describe the associated visual impact upon the traveler.

   Reply: The sections involving visual impact have been reviewed and supplemented as appropriate. The system essentially is the paralleling of existing lines with an additional line. For most of the length of the system, the line is remote from points of observation by most travelers as may be seen from Figures 3, 4, 5, 6, and 7. The route is located where most of the visual observation will be by maintenance inspection flight crews, ranchers, hunters, prospectors, or off-road vehicle recreationists.

2. Comment: For example, all the photographs are aerial views which do not necessarily illustrate the visual landscape as it will be seen by most humans. The visual skylining effect of the transmission line and the planned mitigation, needs to be discussed more fully. For example, the mitigation measure of topographic screening (p.142) seems to be lacking in Figures 12, 19, 20, 44, etc.

   Reply: A review of the photographs indicates that the overall intent of display of incremental effect through essentially vacant terrain was achieved while the "skylining" impact was not specifically included. It can be visualized in some views such as Figure 44. The use of topographic screening is to a large measure illustrated by the above-identified figures inasmuch as the use of valleys remote from highly traveled routes have been predominately used. One of the anomalous situations develop with respect to corridor policy for transportation and utilities as identifed by Public Law 93-153 in Sections (p) and (s), wherein multiple-use of corridors may in some instances achieve maximum utility but minimize an esthetic factor for a short distance.

3. Comment: We suggest you include a detailed discussion of the visual impact of the reflective aspect of the cables which are vividly illustrated in Figure 42. We assume nonspecular conductors will be used.

Reply: The report has been reviewed for locations where this comment regarding reflective conductor materials would provide a pertinent and informative addition. An evaluation of nonspecular conductors has been initiated and conclusions are that there would be no advantage gained by the use of this conductor. The reflective characteristics of a conductor vary with the light intensity, seasonal and daily orientation of the rays, and the surface condition of the conductor which is related to age of the line and the conductor composition. The industry standard of Aluminum Cable Steel Reinforced (ACSR) has a more rapid oxidation rate and surface color change than copper which has not been used for new installations in practice for many years. Refer to the reply to the Forest Service comments on the same item.

ADDRESS ONLY THE DIRECTOR,
BUREAU OF SPORT FISHERIES
AND WILDLIFE

United States Department of the Interior
FISH AND WILDLIFE SERVICE
~~BUREAU OF SPORT FISHERIES AND WILDLIFE~~
WASHINGTON, D.C. 20240

FWS/EC
INT DES 74-105

JAN 15 1975

Memorandum

To: Commissioner of Reclamation

Acting Associate
From: Director, U. S. Fish and Wildlife Service

Subject: Granite Reef Aqueduct Transmission System, Central Arizona Project, Arizona-New Mexico--Review of Draft Environmental Statement (INT DES 74-105)

We have reviewed the subject draft statement transmitted to us by Mr. William F. Graham's memorandum of November 15, 1974.

The environmental statement generally covers the impacts of the transmission system on the fish and wildlife resources along the proposed route and alternatives. However, the following are specific comments on the draft as it relates to fish and wildlife:

Project plans include the closing of access roads and revegetation of areas disturbed during construction of the transmission system. With present day offroad vehicles, successful closing of access and construction roads will be difficult and permanent habitat losses may occur.

From the wildlife standpoint, we prefer alternate route "B" of the Davis-Parker No. 2 line, Alternative No. 1. By using this alternate the roadless area in the foothills of the Chemehuevi Mountains would not be opened up by access and construction roads which would result in the reduction of the carrying capacity of the existing habitat.

Because of the very slow revegetation of disturbed areas in the arid desert where the transmission system will be located, this loss of vegetation should be discussed as a long-term loss in Section VI, The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity.

The opportunity to review this draft environmental statement is appreciated.

H. J. Olds, Jr.

Reply to Comments Made by the
Fish and Wildlife Service
Washington, D.C.
(Memorandum dated January 15, 1975)

1. Comment: Project plans include the closing of access roads and revegetation of areas disturbed during construction of the transmission system. With present day off-road vehicles, successful closing of access and construction roads will be difficult and permanent habitat losses may occur.

   Reply: The difference between and definition of access, construction, and maintenance roads has been clarified to assist reviewers in understanding and relating length of time for use of each. Certain roads, specifically the access roads from existing to the alinement and temporary construction tracks to tower sites will be obliterated or scarified to allow for natural revegetation. In the absence of a water supply in an arid climate, the artificial propagation of revegetation by irrigation is not considered to be a prudent or reasonable expenditure. The existing road network extending throughout the area for multiple-purpose management and use of essentially public lands and islands of private lands are parts of the State and Bureau of Land Management leaseholders' management network and county road systems. The low construction and maintenance standards may give the impression to many that their continued existence is not justified. The Service in cooperation with the Arizona Game and Fish Department is cognizant of the need for public access to areas open for hunting and for proper game management. The control of off-road vehicles is the responsibility of the land management agency under its appropriate regulatory program which has proper legislative authorization.

2. Comment: From the wildlife standpoint, we prefer alternate route "B" of the Davis-Parker No. 2 line, Alternative No. 1. By using this alternate the roadless area in the foothills of the Chemehuevi Mountains would not be opened up by access and construction roads which would result in the reduction of the carrying capacity of the existing habitat.

   Reply: This review comment is recognized. It does pose an interesting situation with respect to comments made by the Bureau of Land Management regarding page **85** that the existing line through Lake Havasu City should be moved to the location objected to by the Service. Bureau of Land Management includes game resource stewardship on lands that it administers as one of that agencies changes. The lack of comment by the Lake Havasu Irrigation and Drainage District indicates that the line location outside the district boundary is not objectionable. Also, see reply to Comment No. 20 to the Bureau of Land Management's letter.

3. Comment: Because of the very slow revegetation of disturbed areas in the arid desert where the transmission system will be located, this loss of vegetation should be discussed as a long-term loss in Section VI, The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity.

Reply: The diversity of plant response to soil disturbance by compaction, scarification, or by the broadcast application of nitrate fertilizers on desert soils as indicated by some recent research activities indicates that this item and section is subjective and judgemental in nature. Further consideration is being given to the most appropriate classification.

4. Comment: Project plans include the closing of access roads and revegetation of areas disturbed during construction of the transmission system. With present day off-road vehicles, successful closing of access and construction roads will be difficult and permanent habitat losses may occur.

Reply: See Comment No. 2 to the Frank Lloyd Wright Foundation's letter and Comment No. 4 to the Office of Fuel and Energy letter. Although blocking of roads may not prevent all intrusions by off-road vehicles, they should discourage the majority of recreational vehicles.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
100 CALIFORNIA STREET
SAN FRANCISCO, CALIFORNIA 94111

JAN 16 1975

E. A. Lundberg, Regional Director
Bureau of Reclamation
P.O. Box 427
Boulder City NV 89005

Dear Mr. Lundberg:

The Environmental Protection Agency has received and reviewed the draft environmental statement for the Granite Reef Aqueduct Transmission System - A Feature of the Central Arizona Project, State of Arizona.

EPA's comments on the draft environmental statement have been classified as Category ER-2 pending resolution of the comments noted in the attachment to this letter. Definitions of the categories are provided on the enclosure. The classification and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and the adequacy of the environmental statement.

EPA appreciates the opportunity to comment on this draft environmental statement and requests one copy of the final environmental statement when available.

Sincerely,

Paul De Falco, Jr.
Regional Administrator

Enclosure

cc: Council on Environmental Quality, Wash., DC 20460

Comments On the Draft Environmental Statement for the Granite Reef Aqueduct Transmission System-A Feature of the Central Arizona Project, State of Arizona.

Fugitive Dust:

Construction and maintenance of the proposed transmission line will require the use of presently existing access roads and the construction of 70 miles of new roads. Concerning these new roads, the EIS states: "Compliance with standard Reclamation rules and guidelines for construction practices, which include dust abatement, will reduce the amount of dust resulting from construction to a point where it will not have significant impact greater than ambient levels in the project area" (Page 140). EPA wishes to advise the Bureau of Reclamation that all areas through which the transmission line may pass are in violation of the National Ambient Air Quality Standard for particulate matter. Fugitive dust is a special problem in this arid climate and flat terrain, and extreme and unusual care should be taken to reduce dust to a minimum during and following construction. The EIS proposes some specific measures for dust control, but fails to describe how they will be implemented or how effective they have proven in areas such as those proposed for the transmission route.

The draft environmental statement suggests to EPA the following specific questions: What measures will be taken to prevent the indiscriminate use of construction and maintenance roads? What portion of the roads will be scarified? What additional techniques will be used to restore vegetation and obliterate unused roads? What is the extent of planned reseeding? Does the Bureau intend to pursue an active campaign to discourage use of these roads by recreational vehicles? During construction, will there be an effort to limit the number of construction vehicles?

Water:

Since it is proposed to use natural washes as much as possible for access roads (Page 105), the problem of water quality demands more thorough treatment. The environmental statement should more fully discuss the specific mitigating measures proposed to protect water quality. In addition the EIS should discuss the likelihood that maintenance operations will be required during times of heavy rainfall when drainage channels and wash bottoms are especially vulnerable to damage.

Design Considerations:

The advantages of an underground cable should be carefully weighed, especially in the Lake Mead National Recreation area and at Lake Havasu City. It may be possible to take this occasion to put the existing Davis-Parker 230KV and the Lake Havasu 69KV lines beneath the ground.

Underground cable is not considered in the environmental statement where the transmission route might follow the canal alignment and where both projects can be constructed at the same time sharing the same right-of-way. Pumping stations and substations could be built together, new lines and access roads could be substantially reduced, maintenance trips could be combined, and several adverse air and water quality impacts minimized.

Energy Considerations:

The environmental statement indicates "It is not anticipated that new load centers would develop because of the intermittent and unscheduled nature of this excess supply" (Page 154). However, in-service date for the transmission line precedes completion of the aqueduct by up to eight years. The critical sections from Davis to Parker and from Parker to Liberty are expected to be in operation by May 1, 1977, and July 1, 1979, respectively. The environmental statement should discuss the possibility that these additions of surplus power will create a new demand and cause a need for yet another new transmission line through this power corridor when the opening of the Granite Reef Aqueduct actually occurs. To the extent that any surplus power can be used for urban or industrial development, the environmental impacts of such development should be discussed.

The environmental statement gives the impression that the great bulk of power flowing in the transmission lines will be used for the aqueduct system. Power requirements of the pumping facilities, however, are 1,675 GWH per year (Page 156). This leaves 1,804 GWH annually for sale to other utilities (Page 154). There is no discussion of potential customers for this new source of energy. An expansion of Lake Havasu City suggest itself as one likely possibility which may have significant environmental impact. EPA reiterates the question of secondary impact through urban and industrial uses of this surplus power should be considered in this environmental statement.

Environmental Impact of the Action

LO--Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER--Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU--Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1--Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2--Insufficient Information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3--Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft impact statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

Figure 3-1. Attachment
Page 2 of 2

Replies to Comments Made by the Environmental Protection Agency San Francisco, California (Letter dated January 16, 1975)

1. Comment: Construction and maintenance of the proposed transmission line will require the use of presently existing access roads and the construction of 70 miles of new roads. Concerning these new roads, the EIS states: "Compliance with standard Reclamation rules and guidelines for construction practices, which include dust abatement, will reduce the amount of dust resulting from construction to a point where it will not have significant impact greater than ambient levels in the project area" (Page 140). EPA wishes to advise the Bureau of Reclamation that all areas through which the transmission line may pass are in violation of the National Ambient Air Quality Standard for particulate matter. Fugitive dust is a special problem in this arid climate and flat terrain, and extreme and unusual care should be taken to reduce dust to a minimum during and following construction. The EIS proposes some specific measures for dust control, but fails to describe how they will be implemented or how effective they have proven in areas such as those proposed for the transmission route.

Reply: Strict adherence to the dust abatement provisions of the construction specifications will be enforced. Depending upon labor contracts in force, workers traveling to work areas may leave their individual private vehicles at the end of pavement and proceed to jobsite locations along the transmission system alinement in contractor-owned or -operated construction equipment and vehicles. This would reduce the vehicular traffic along the system segment under construction. Road surfaces will be maintained by motor patrol. The coarse granular character of the predominant earth surface is such that extraordinary measures or vehicular speed limits are generally not required to maintain dust control within construction specification standards. Extreme cases of deep pulverized fine soils may be treated by removal or admixing of granular material by motor patrol, or possible resort to sprinkling or other palliative treatment. Section IV.B.4. has been expanded to show how preventive measures for dust control will be implemented during construction. As it is recognized that the project area often cannot meet National Ambient Air Quality Standards because of natural adverse weather conditions (i.e., high winds) there is no estimate as to how effective these control methods will be. In all probability there will be instances when during construction the standards will continue to be violated.

2. Comment: What measures will be taken to prevent the indiscriminate use of construction and maintenance roads?

Reply: The majority of the roads used will be existing roads already used for transmission line maintenance. New roads used for those lines or portions of lines that do not parallel existing lines will be closed and put to bed in order to discourage indiscriminate use. Refer to reply to Comment No. 2 of the Frank Lloyd Wright Foundation's letter.

3. Comment: What portion of the roads will be scarified? What additional techniques will be used to restore vegetation and obliterate unused roads? What is the extent of planned reseeding?

Reply: The vegetation in the area where these transmission lines are being constructed is very sparse and widely scattered. Roads that will not be used for maintenance will be allowed to revegetate naturally because rainfall is generally too low to justify artificial reseeding. See reply to comment No. 4 of Fuel and Energy letter.

4. Comment: Does the Bureau intend to pursue an active campaign to discourage use of these roads by recreational vehicles?

Reply: Consistent with our policy of cooperation in purposeful Federal and State land management for outdoor recreation, judgmental interpretation of maintenance road use will not be a factor on restrictions. Where the access is specifically restricted by the land manager or owner, these policies will be respected and the roads posted and/or closed. New roads will be closed as described in reply to Comment No. 2. Whereas Reclamation does not have policing authority in controlling use of access roads by recreational vehicles it cannot pursue an active **campaign to discourage their use.**

5. Comment: During construction, will there be an effort to limit the number of construction vehicles?

Reply: We do not anticipate a large number of construction vehicles using the roads at any one time and generally those vehicles using the road are necessary for construction. To limit the number of construction vehicles would impede construction progress.

6. Comment: Since it is proposed to use natural washes as much as possible for access roads (Page 105), the problem of water quality demands more thorough treatment. The environmental statement should more fully discuss the specific mitigating measures proposed to protect water quality. In addition the EIS should discuss the likelihood that maintenance operations will be required during times of heavy rainfall when

drainage channels and wash bottoms are especially vulnerable to damage.

Reply: Sections II.A., II.G., and III.B.2.a.(3) of the final environmental statement have been revised to discuss water quality impacts associated with use of washes for access.

7. Comment: The advantages of an underground cable should be carefully weighed, especially in the Lake Mead National Recreation area and at Lake Havasu City. It may be possible to take this occasion to put the existing Davis-Parker 230KV and the Lake Havasu 69KV lines beneath the ground.

Underground cable is not considered in the environmental statement where the transmission route might follow the canal alignment and where both projects can be constructed at the same time sharing the same right-of-way. Pumping stations and substations could be built together, new lines and access roads could be substantially reduced, maintenance trips could be combined, and several adverse air and water quality impacts minimized.

Reply: In the LMNRA, an underground cable system would create an adverse impact greater than the impact of the overhead carriers. For this reason, underground cables were not considered for the LMNRA or Lake Havasu Recreational Area crossings.

Where the transmission line is parallel to the aqueduct before connecting to the Hassayampa Pumping Plant, the aqueduct maintenance road is shared with the transmission line. The comparative cost, 10 times that of overhead carried lines, makes underground installation impractical for this 2.3-mile length. See reply to Comment No. 2 of the Bureau of Outdoor Recreation's letter for a more detailed discussion of underground transmission lines.

In regard to combining pumping plants and substations, reference should be made to the alternative route discussion in the final environmental statement FES 74-5 for illustration and presentation of material relating to the topographic and economic deficiencies to this concept.

8. Comment: The environmental statement indicates "It is not anticipated that new load centers would develop because of the intermittent and unscheduled nature of this excess supply" (Page 154). However, in-service date for the transmission line precedes completion of the aqueduct by up to eight years. The critical sections from Davis to Parker and from Parker to Liberty are expected to be in operation by May 1, 1977, and July 1, 1979, respectively. The environmental statement should discuss the possibility that these additions of surplus

power will create a new demand and cause a need for yet another new transmission line through this power corridor when the opening of the Granite Reef Aqueduct actually occurs. To the extent that any surplus power can be used for urban or industrial development, the environmental impacts of such development should be discussed.

Reply: Although some of the transmission lines associated with the Granite Reef Aqueduct Transmission System are scheduled for completion prior to the aqueduct itself, their construction scheduling and use in carrying power prior to completion of the transmission system and the aqueduct is not associated with the power or energy availability from the Navajo Generating plant. By constructing the Davis-Parker No. 2, 230-kV line first, the Parker-Phoenix No. 1, 161-kV line can be permanently removed from service and the Parker-Liberty 230-kV line constructed on its right-of-way without jeopardizing transmission system reliability. Scheduling the lines as indicated in paragraph I.D.4. will allow the new lines to be built with a minimum of power interruptions and yet meet the in-service date of the Granite Reef Aqueduct.

At the present time the Bureau's share of the Navajo power is being sold to Southern California Edison and the Navajo Participants prior to the time CAP will require energy for pumping; therefore, this surplus power is not creating a new demand but only filling an already existing demand.

9. Comment: The environmental statement gives the impression that the great bulk of power flowing in the transmission lines will be used for the aqueduct system. Power requirements of the pumping facilities, however, are 1,675 gWh per year (page 156). This leaves 1,804 gWh annually for sale to other utilities (Page 154). There is no discussion of potential customers for this new source of energy. An expansion of Lake Havasu City suggest itself as one likely possibility which may have significant environmental impact. EPA reiterates the question of secondary impact through urban and industrial uses of this surplus power should be considered in this environmental statement.

Reply: It should be noted that the 1675 gWh per year mentioned in the comment is the long-term average pumping requirement for the Granite Reef Aqueduct system computed at the pumping plants. The total long-term average requirement for the CAP is estimated to be 2,267 gWh per year at the point of generation. Energy in excess of that required for pumping will be determined on a forecasted schedule--probably for a 3-year duration. The Colorado River Basin Project Act provides that power and energy not required for CAP ' . . . may be disposed of intermittently by the Secretary for other purposes at such prices as he may determine, including its marketing in conjunction with the sale of power and energy from Federal powerplants in the Colorado River System so as to produce the greatest practicable amount of power and energy that can be sold at firm power and energy rates.' During the interim period prior to the United States' need for CAP pumping power, the United States entered into contracts with the Navajo Project Participants and the Southern California Edison Company for interim sale of United States' entitlement of Navajo Project power. These contracts remain in effect for 20 years. The United States, however, effective on or after January 1, 1980, reserves the right to terminate these contracts subject to at least 5 years advance written notice.

After the operation of CAP is more firmly defined, studies will be performed to determine the most effective method of marketing excess energy in accordance with the authorizing act. Since the excess energy available may vary each year depending on water supply, any expansion of Lake Havasu City or the requirements of new customers along the route cannot be predicated on the Granite Reef Aqueduct transmission system which is being constructed to supply the CAP portion of Navajo Project power to CAP.

United States Department of the Interior

BUREAU OF MINES
WASHINGTON, D.C. 20240

January 17, 1975

DES 74-105

Memorandum

To: Commissioner of Reclamation

Through: Assistant Secretary--Energy and Minerals

JAN 29 1975

From: Director, Bureau of Mines

Subject: Draft environmental statement, Granite Reef Aqueduct transmission system, Central Arizona Project, Arizona-New Mexico, Bureau of Reclamation

Our Intermountain Field Operation Center, Denver, has reviewed the subject statement that pertains to proposed construction of about 333 miles of new power transmission lines, most of which will parallel existing lines, to supply power to the proposed Granite Reef Aqueduct from the Navajo Generating Station near Page, Arizona. The line will be located in Clark County, Nevada, San Bernardino County, California, and Mohave, Yuma, and Maricopa Counties, Arizona.

An examination of library data, without benefit of field investigation, revealed that during 1971 mineral deposits in the counties affected yielded commodities and values as follows:

State	County	Commodities	Value (Thousand dollars)
Nevada (1972)	Clark	Sand and gravel, salt, stone, tungsten	16,769
California (1971)	San Bernardino	Cement, boron compounds, stone, sand and gravel, potassium salts, sodium sulfate, rare-earth minerals, salt, petroleum, clays, lime, calcium-magnesium chloride, talc, iron ore, bromine, lithium minerals, natural gas, tungsten, pumice, gypsum, silver, gold, copper	146,932

Memo. to Commissioner of Reclamation, Subj: Granite Reef Aqueduct, Arizona and New Mexico

State	County	Commodities	Value (Thousand dollars)
Arizona (1971)	Mohave	Copper, molybdenum, sand and gravel, silver, stone, feldspar, gold, tungsten, clays	34,071
(1971)	Maricopa	Sand and gravel, lime, stone, clays, mica, copper, silver, gold	14,420
(1971)	Yuma	Sand and gravel, stone, copper, silver, gold	W*

---

*Withheld to avoid disclosing company confidential data.

Known mineral resources along or near the proposed route include copper, lead, zinc, gold, silver, manganese, titanium, tungsten, pumice, perlite, scoria, mercury, vanadium, zinc, thorium and rare earths, uranium, barite, gypsum, stone, sand and gravel, and beryllium and other pegmatite minerals. Current mining operations along the route are in Clark County, Nevada, but the statement indicates (p. 122) that these operations would not be affected by the lines. The statement further indicates (p. 58) that while traces of copper, gold, iron, silver, manganese, and lead are common along the route, there has been little production of metallic ores because of low grades, limited size of ore bodies, and high production costs. We tend to agree, but because of the raw material shortage presently developing in the U.S., deposits that have been uneconomic in the past may now or in the future have potential. The report does indicate, however, (p. 96), that no mines are being worked on the right-of-way but that existing mining claims will be adjudicated and valid claims purchased. The statement also indicated that crossing agreements will preclude structure site locations close to four pipelines that cross the area.

We fail to understand why mining claims need to be purchased, especially in view of the fact that the new line will parallel the existing line. Many powerlines cross mining claims and mineral operations as they do other private lands and other land use operations without need of acquisition. Mineral deposits, site specific as they are, should not be withdrawn from potential production, Memo. to Commissioner of Reclamation, Subj: Granite Reef Aqueduct, Arizona and New Mexico

The Bureau of Reclamation has given a broad summary of the mineral situation along the proposed route. The statement would be improved by a more definitive list of mineral occurrences and their geographic sites along or near the rights-of-way, as well as known mines or claim groups. We urge that this data be incorporated in the final statement and that every effort be made to permit continued mineral exploration. Otherwise, the statement is adequate as written.

Director

Reply to Comment Made by the Bureau of Mines
Washington, D.C.
(Memorandum dated January 17, 1975)

The letter provided considerable valuable information regarding the mineral resources of the counties in three states that are crossed by the transmission line. These data have been incorporated into the final statement.

1. Comment: We fail to understand why mining claims need to be purchased, especially in view of the fact that the new line will parallel the existing line. Many powerlines cross mining claims and mineral operations as they do other private lands and other land use operations without need of acquisition. Mineral deposits, site specific as they are, should not be withdrawn from potential production.

   The Bureau of Reclamation has given a broad summary of the mineral situation along the proposed route. The statement would be improved by a more definitive list of mineral occurrences and their geographic sites along or near the rights-of-way, as well as known mines or claim groups. We urge that this data be incorporated in the final statement and that every effort be made to permit continued mineral exploration. Otherwise, the statement is adequate as written.

   Reply: The Bureau of Mines is correct in stating that powerlines cross existing mining claims without interfering with operations and requiring acquisition. A review of the alinement maps for the transmission system indicates there are no active mining operations presently along the proposed right-of-way. As right-of-way is acquired for this project each claim encountered will be evaluated on an individual basis to determine if operations under it will jeopardize proposed tower structures and the line itself. This evaluation will be the basis for whether the claim is purchased or not.

   With respect to listing the mineral resources of this alinement, there are no active mining claims along this right-of-way and so this listing has not been included.

CLAIRE T. DEDRICK
SECRETARY

EDMUND G. BROWN JR.
GOVERNOR OF
CALIFORNIA

OFFICE OF THE SECRETARY
RESOURCES BUILDING
1416 NINTH STREET
95814

Department of Conservation
Department of Fish and Game
Department of Navigation and
Ocean Development
Department of Parks and Recreation
Department of Water Resources

Air Resources Board
Colorado River Board
San Francisco Bay Conservation a
Development Commission
State Lands Commission
State Reclamation Board
State Water Resources Control Boa
Regional Water Quality Control Bo

THE RESOURCES AGENCY OF CALIFORNIA
SACRAMENTO, CALIFORNIA

JAN 24 1975

Mr. E. A. Lundberg
Regional Director, Region 3
Bureau of Reclamation
U. S. Department of the Interior
P. O. Box 427
Boulder City, Nevada 89005

Dear Mr. Lundberg:

The State of California has reviewed the Draft Environmental S~~tatement dated~~ November 14, 1974, for the Granite Reef Aqueduct Transmission System, which was submitted to the Office of Planning and Research (State Clearinghouse) within the Governor's Office.

Participating in this review, which fulfills the requirements under Part II of the U. S. Office of Management and Budget Circular A-95 and the National Environmental Policy Act of 1969, were the Departments of Water Resources, Food and Agriculture, Transportation, Health, Conservation, Fish and Game, Navigation and Ocean Development, and Parks and Recreation; the State Water Resources Control Board; the Colorado River Board of California; and the Reclamation Board.

We have no comment to offer on this Draft Environmental Statement.

Sincerely,

CLAIRE T. DEDRICK
Secretary for Resources

By

cc: Director of Management Systems
State Clearinghouse
Office of Planning and Research
1400 Tenth Street
Sacramento, California 95814
(SCH No. 74120939)

Reply to Comments Made by
The Resources Agency of California
Sacramento, California
(Letter dated January 24, 1975)

No reply to this letter is considered necessary.

INFORMATION COPY FOR 100, 150, 200,
400, 600, 780, APO

Colorado
Division of Planning

Richard D. Lamm
xxxxxxxxxx / Governor

1575 Sherman Street / Denver, Colorado / 80203
Philip H. Schmuck / Director

Department of Local Affairs
Phone / (303) 892-2178

February 6, 1975

Mr. E. A. Lundberg, Regional Director
United States Department of the Interior
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, Nevada 89005

RE: Draft Environmental Statement --
Granite Reef Aqueduct Transmission System,
Central Arizona Project

Dear Mr. Lundberg:

Thank you for providing the Colorado State Clearinghouse an opportunity to review the above-referenced Draft Environmental Statement. The Clearinghouse does not anticipate any significant environmental impact of the proposed project on Colorado. We appreciate your effort to keep us informed about activities in your region.

Sincerely,

Philip H. Schmuck

Philip H. Schmuck
Director

PHS/JO/vt - Enclosures

cc: Betty Miller, Executive Director, Department of Local Affairs
Jim Monaghan, Assistant to the Governor on Natural Resources
Robert Siek, Assistant Director of Public Health Environmental Programs
Jeris Danielson, Deputy State Engineer, Division of Water Resources

COLORADO DEPARTMENT OF HEALTH

4210 EAST 11TH AVENUE • DENVER, COLORADO 80220 • PHONE 388-6111
Edward G. Dreyfus, M.D., M.P.H., Executive Director

January 8, 1975

Mr. Jim Ohi
Senior Planner
Colorado Division of Planning
1575 Sherman Street
Denver, CO 80203

Subject: Granite Reef Aqueduct Transmission System

Dear Mr. Ohi:

The Colorado Department of Health, Environmental Programs, have reviewed the Granite Reef Aqueduct Transmission Line Draft Environmental Impact Statement and have no comments relative to any environmental impact. This is especially true because at its nearest point it would be located 312 miles from the Colorado border.

Thank you for this opportunity to comment.

Sincerely,

Robert D. Siek
Assistant Director of Health
Environmental Programs

RECEIVED
JAN 10 1975
DIVISION OF
PLANNING

RDS/pl

JOHN D. VANDERHOOF
Governor

C. J. KUIPER
State Engineer

DIVISION OF WATER RESOURCES
Department of Natural Resources
300 Columbine Building
1845 Sherman Street
Denver, Colorado 80203

December 26, 1974

Mr. Jim Ohi, Senior Planner
Colorado Division of Planning
1575 Sherman Street
Denver, Colorado 80203

Re: Environmental Statement on Granite Reef Aqueduct Transmission System

Dear Mr. Ohi:

The above referenced report, prepared by the USBR, has been reviewed by the staff of this office. We have no adverse comments on the proposed Granite Reef Aqueduct Transmission System from an environmental standpoint.

Very truly yours,

Jeris A. Danielson

Dr. Jeris A. Danielson
Deputy State Engineer

JAD/ARQ:mvg

Reply to Comment Made by the
Colorado Division of Planning
(State Clearinghouse)
(Letter dated February 6, 1975)

No reply to this letter is considered necessary.

Public Hearing Comments
Granite Reef Aqueduct Transmission System
INT DES 74-105
December 19, 1974

The comments by Mr. Martin Wurbs for the Arizona Water Commission at the 2:00 p.m. session of the hearing presented no specific comment that requires a reply. Mr. Wurbs was the only commenter at the 2:00 p.m. session.

Comment:

The comments of Mr. Wing Wachtel, attorney, businessman, and community leader working on incorporation for Lake Havasu City were primarily oriented toward what he considered a lack of information or publicity about the Central Arizona Project, its component facilities, and identifying the years when construction activities would be undertaken that would have a resulting economic and social impact upon Lake Havasu City and the purpose, time, and date of the public hearing. Mr. Wachtel was the only commenter at the evening session.

Reply:

From Mr. Wachtel's comments, a review will be made of communities in the proximity of project facilities to ascertain the community infrastructure that might best be utilized for information and communication in the absence of, or in addition to the local governing body. In unincorporated communities such as Lake Havasu City, the Chamber of Commerce or school boards might be appropriate adjunct organizations. The extent of notification to the public of a public hearing is described in Section IX.C. One week prior to the public hearing, several community leaders had visited the Projects Office to determine what method might be employed to obtain a more adequate power supply for the Lake Havasu City area to support industrial plants interested in locating in the community but not able to obtain a power supply commitment from the local utility. These same leaders were present at the afternoon session but did not comment on the environmental statement.

APPENDIX B

Appendix B

Advisory Commission on Arizona Environment

List of Participating Agencies and Organizations

ABI Corporation, Scottsdale

Advisory Council on Intergovernmental Relations, Office of the Governor

American Association of University Women

American Society of Landscape Architects, Arizona Chapter

Arizona Academy of Science

Arizona Association of Colored Women's Clubs

Arizona Atomic Energy Commission

American Arbitration Association

Arizona Bureau of Mines, College of Mines, The University of Arizona

Arizona Commission of Agriculture and Horticulture

Arizona Community Planners and Developers Association

Arizona Council of Engineering and Scientific Associations, Tucson Regional Committee

Arizona Department of Education

Arizona Department of Mineral Resources

Arizona Department of Public Safety

Arizona Education Association

Arizona Environmental Education Association

Arizona Federation of Garden Clubs, Inc.

Arizona Federation of Republican Women, Environmental Quality Committee

Arizona Game and Fish Department

Arizona Highway Department

Arizona Hotel and Motel Association

Arizona Mining Association

Arizona Outdoor Recreation Coordinating Commission

Arizona Parks and Recreation Association

Arizona Public Health Association

Arizona Public Service Company

Arizona State Department of Health

Arizona State Land Department

Arizona State Nurses Association

Arizona State Parks Board

Arizona State University

Arizona Water Commission

Arizona Wildlife Federation

Bashas' Markets, Chandler

Bisbee Council on the Arts and Humanities

Boy Scouts of America, Theodore Roosevelt Council

Bozell, Jacobs & Wallrapp, Inc., Phoenix

Chandler Beautification Committee

Coconino Sportsmen

Construction Graphics, Lake Havasu City

Corps of Engineers, U.S. Department of the Army

Department of Civil Engineering, College of Engineering, The University of Arizona

Desert Caballeros Western Museum, Wickenburg

Eller Outdoor Advertising Company of Arizona

Henderson Realty, Tucson

Immigration and Naturalization Service, Nogales

Institute of Electrical and Electronics Engineers, Tucson Section

Department of the Interior

  Bureau of Land Management

  Bureau of Mines

  Bureau of Reclamation

  Fish and Wildlife Service, Division of River Basin Studies

  National Park Service

Kingman-Mohave County Chamber of Commerce

League of Women Voters

Lowell Observatory, Flagstaff

Maricopa Audubon Society

Maricopa County Parks and Recreation Department

Mayor's Youth Advisory Board, Phoenix

Gordon J. McCulloch & Associates, Consulting Engineers

Men's Garden Club of Tucson

Mountain Bell

National Committee for Support of the Public Schools

National Wildlife Federation

Navajo Communication Board, Window Rock

Phoenix Coca-Cola Bottling Company

Roman Catholic Diocese of Tucson

Salt River Project

SAVE, Inc. (Sportsmen Against Vandalism Everywhere)

School of Forestry, Northern Arizona University

Simon and Jekel, Attorneys at Law

Soil Need, Inc., Globe

Southern Arizona Environmental Council

Southwest Forest Industries

Tonto National Forest, U.S. Department of Agriculture

The Arizona Daily Star

The National Brewing Company

The Navajo Nation, Window Rock

The Arizona Republic

Tucson Consumers Council

Tucson Environmental Committee

Tucson Gas & Electric Company

United States Brewers Association, Inc.

U.S. Public Health Service, Window Rock

Valley Christian Centers, Phoenix

Valley Forward Association, Phoenix

Valley National Bank

Yates Army-Navy Stores, Inc.

Yavapai Group, Grand Canyon Chapter, Sierra Club, Prescott

Yuma County Cotton Wives

APPENDIX C

Table 1 Amphibians and Reptiles in the Vicinity of the Granite Reef Transmission System

		Relative Abundance*			
		Rare	Uncommon	Common	Very Common
Couches Spadefoot	*Scaphiopus couchi*		X		
Colorado River Toad	*Bufo alvarius*			X	
Woodhouse's Toad	*Bufo woodhousei*		X		
Great Plains Toad	*Bufo cognatus*			X	
Bad-spotted Toad	*Bufo punctatus*			X	
Treefrog	*Hyla arenicolor*	X			
Leopard Frog	*Rana pipiens*		X		
Desert Tortoise	*Gopherus agassizi*		X		
Gila Monster	*Heloderma suspectum*		X		
Banded Gecko	*Coleonyx variegatus*				X
Desert Iguana	*Dipsosaurus dorsalis*				X
Collared Lizard	*Crotaphytus collaris*				X
Leopard Lizard	*Gambelia wislizeni*		X		
Chuckwalla	*Sauromalus obesus*			X	
Zebra-tailed Lizard	*Collisaurus draconoides*			X	
Desert Spiny Lizard	*Sceloporus magister*				X
Long-tailed Brush Lizard	*Urosaurus graciosus*				X
Tree Lizard	*Urosaurus ornatus*				X
Side-blotched Lizard	*Uta stansburiana*				X
Desert Horned Lizard	*Phrynosoma platyrhinos*				X
Flat-tailed Horned Lizard	*Phrynosoma m'calli*	X			
Desert Night Lizard	*Xantusia vigilis*		X		
Western Whiptail	*Cnemidophorus tigris*				X
Western Blind Snake	*Leptotyphlops humilis*	X			
Desert Boa	*Lichanura trivirgata*	X			

*"Relative Abundance" means the abundance of the animal in the Granite Reef Transmission System area relative to the abundance of other species in the area.

Table 1 Amphibians and Reptiles in the Vicinity of the Granite Reef Transmission System (cont.)

		Relative Abundance*			
		Rare	Uncommon	Common	Very Common
Checkered Garter Snake	*Thamnophis marcianus*			X	
Coachwhip; Whipsnake (Red Racer)	*Masticophis flagellum*			X	
Desert Patch-nosed Snake	*Salvadora hexalepis*	X			
Ringneck Snake	*Diadophis punctatus*	X			
Bullsnake; Gopher Snake	*Pituophis melanoleucas*				X
Glossy Snake	*Arizona elegans*			X	
Long-nosed Snake	*Rhinocheilus lecontei*			X	
Common Kingsnake	*Lampropeltis getulus*			X	
Spotted Leaf-nosed Snake	*Phyllorhynchus decurtatus*			X	
Western Ground Snake	*Sonora semiannulata*	X		X	
Western Shovel-nosed Snake	*Chionactis occipitalis*			X	
Southwestern Lyre Snake	*Trimorphodon lyrophanes*		X		
Night Snake	*Hypsiglena torquata*			X	
Arizona Coral Snake	*Micruroides euryxanthus*		X		
Western Diamondback Rattlesnake	*Crotalus atrox*		X		
Black-tailed Rattlesnake	*Crotalus molossus*		X		
Mohave Rattlesnake	*Crotalus scutulatus*			X	
Speckled Rattlesnake	*Crotalus mitchelli*			X	
Sidewinder	*Crotalus cerastes*				X

Note: Information in this table was compiled by the Environmental Staff of the Bureau of Reclamation with editorial cooperation and consultation from members of the academic staff at Arizona State University.

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System

Explanation

1 Common and scientific names were taken from the Check-list of North American Birds and Supplement published by The American Ornithologists' Union.

2 Relative abundance refers to the abundance of a species relative to other similar species (i.e. hawk relative to hawks).

*Indicates nesting
**Introduced species

E-Listed as Endangered in Fish and Wildlife Service's 1973 edition of Threatened Wildlife of the United States.
T-Listed as Threatened.
SU-Listed as Status Undetermined.

KEY TO RELATIVE ABUNDANCE:

S--March - May
S--June - August
F--September - November
W--December - February

a--abundant
c--common
u--uncommon
o--occasional
r--rare

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System

Common Name[1]	Scientific Name[1]	Relative Abundance[2]			
		S	S	F	W
Common Loon	*Gavia immer*	o	r	o	o
Arctic Loon	*Gavia arctica*	accidental			
Horned Grebe	*Podiceps auritus*	accidental			
Eared Grebe	*Podiceps nigricollis*	c	o	c	c
Western Grebe	*Aechmophorus occidentalis*	c	o	c	c
*Pied-billed Grebe	*Podilymbus podiceps*	u	u	c	c
White Pelican	*Pelecanus erythrorhynchos*	c	o	c	u
Brown Pelican	*Pelecanus occidentalis*	accidental			
*Double-crested Cormorant	*Phalacrocorax auritus*	a	c	a	a
*Great Blue Heron	*Andea herodias*	c	c	c	c
*Green Heron	*Butorides virescens*	u	c	u	r
*Common Egret	*Casmerodius albus*	c	c	c	c
*Snowy Egret	*Egretta thula*	c	c	c	c
*Black-crowned Night Heron	*Nycticorah mycticorax*	u	c	c	u
*Least Bittern	*Ixobrychus exilis*	u	c	c	u
American Bittern	*Botaurus lentiginosus*	r		u	u
Wood Ibis	*Mycteria americana*		o	u	
White-faced Ibis	*Plegadis chihi*	o		o	
Whistling Swan	*Olor columbianus*			o	o
Canada Goose	*Branta canadensis*	u		c	c
White-fronted Goose	*Anser albifrons*	r		o	r
Snow Goose	*Chen caerulescens*	o		c	c
Ross' Goose	*Chen rossii*	accidental			
Fulvous Tree Duck	*Dendrocygna bicolor*	accidental			
*Mallard	*Anas platyrhynchos*	u	o	c	c
*Gadwall	*Anas strepera*	u	r	c	c
Pintail	*Anas acuta*	c	o	a	u
Green-winged Teal	*Anas crecca*	o	r	c	a
Blue-winged Teal	*Anas discors*	o	r		

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System (Cont.)

Common Name[1/]	Scientific Name[1/]	Relative Abundance[2/]			
		S	S	F	W
Cinnamon Teal	*Anas cyanoptera*	c	o	a	o
European Wigeon	*Anas penelope*	accidental			
American Wigeon	*Anas americana*	u	o	c	c
Shoveler	*Anas clypeata*	o	r	c	c
Wood Duck	*Aix sponsa*			r	r
Redhead	*Aythya americana*	c	o	c	u
Ring-necked Duck	*Aythya collaris*	o		u	u
Canvasback	*Aythya valisineria*	o		u	u
Lesser Scaup	*Aythya affinis*	c	o	c	u
Common Goldeneye	*Bucephala clangula*	o		o	u
Bufflehead	*Bucephala albeola*	c		c	c
Oldsquaw	*Clangula hyemalis*	accidental			
Ruddy Duck	*Oxyura jamaicensis*	c	o	a	u
Hooded Merganser	*Lophodytes cucullatus*				r
Common Merganser	*Mergus merganser*	o	o	o	c
Red-breasted Merganser	*Mergus serrator*	c	r	c	r
Turkey Vulture	*Cathartes aura*	c	c	u	o
Sharp-skinned Hawk	*Accipiter striatus*	u		u	u
*Cooper's Hawk	*Accipiter cooperii*	u	r	c	u
*Red-tailed Hawk	*Buteo jamaicensis*	c	c	c	c
Swainson's Hawk	*Buteo swainsoni*	accidental			
*Zone-tailed Hawk	*Buteo albonotatus*		r	r	
White-tailed Hawk	*Buteo albicaudatus*				r
Rough-legged Hawk	*Buteo lagopus*	accidental			
Ferruginous Hawk	*Buteo regalis*	accidental			
*Harris' Hawk	*Parabuteo unicinctus*	o	o	o	o
Golden Eagle	*Aquila chrysaetos*				u

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System (Cont.)

Common Name[1/]	Scientific Name[1/]	Relative Abundance[2/]			
		S	S	F	W
E Bald Eagle	Haliaeetus leucocephalus				r
Marsh Hawk	Circus cyaneus	u		c	c
SU Osprey	Pandion haliaetus	c	r	c	o
T Prairie Falcon	Falco mexicanus	r	r	r	r
E Peregrine Falcon	Falco peregrinus	o	o	o	o
Pigeon Hawk	Falco columbarius			u	o
*Sparrow Hawk	Falco sparverius	c	u	c	c
*Gambel's Quail	Lophortyx gambelii	a	a	a	a
Sandhill Crane	Grus canadensis	o		o	
E*Yuma Clapper Rail	Rallus longirostris yumanensis	c	c		
Virginia Rail	Rallus limicola	r		u	u
Sora	Porzana carolina	c		c	c
*Common Gallinule	Gallinula chloropus	u	u	u	u
*American Coot	Fulica americana	c	c	c	a
Semipalmated Plover	Charadrius semipalmatus	u	o	u	
Snowy Plover	Charadrius alexandrinus	u	c	c	r
*Killdeer	Charadrius vociferus	c	c	c	c
Mountain Plover	Charadrius montanus			r	
Black-bellied Plover	Pluvialis squatarola	o	o	o	
Common Snipe	Capella gallinazo	u		u	u
Long-billed Curlew	Numenius americanus	u	c	u	
Whimbrel	Numenius phaeopus			r	
Spotted Sandpiper	Actitis macularia	c	u	c	u
Solitary Sandpiper	Tringa solitaria	r	u	u	
Willet	Catoptrophorus semipalmatus	u	c		
Greater Yellowlegs	Tringa melanoleucus	u	u	c	o
Lesser Yellowlegs	Tringa flavipes	o	o	o	o

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System (Cont.)

Common Name[1]	Scientific Name[1]	Relative Abundance[2] S	S	F	W
Pectoral Sandpiper	Calidris melanotos			o	
Baird's Sandpiper	Calidris bairdii		u	u	
Least Sandpiper	Calidris minutilla	u		c	c
Dunlin	Calidris alpina	r		o	r
Western Sandpiper	Calidris mauri	u	c	c	
Sanderling	Calidris alba	r	r	r	
Long-billed Dowitcher	Limnodromus scolopaceus	u		c	u
Marbled Godwit	Limosa fedoa	o	c	r	
American Avocet	Recurvirostra americana	u	c	c	r
Black-necked Stilt	Himantopus mexicanus	o	c	u	
Red Phalarope	Phalaropus fulicarius			r	
Wilson's Phalarope	Steganopus tricolor	o	u	u	
Northern Phalarope	Lobipes lobatus	r	c	u	
Parasitic Jaeger	Stercorarius parasiticus	accidental			
Herring Gull	Larus argentatus				o
California Gull	Larus californicus	c		u	
Ring-billed Gull	Larus delawarensis	C	U	C	C
Franklin's Gull	Larus pipixcan			r	
Bonaparte's Gull	Larus philadelphia	o		o	r
Sabine's Gull	Xema sabini			r	
Forster's Tern	Sterna forsteri	u	c	u	
Common Tern	Sterna hirundo		u	u	
Caspian Tern	Hydroprogne caspia	o	c	u	
Black Tern	Childonias niger	o	c	u	
*Mourning Dove	Zenaida macroura	c	a	c	u
*White-winged Dove	Zenaida asiatica	u	c	u	
Ground Dove	Columbiana passerina		r	r	

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System (Cont.)

Common Name[1/]	Scientific Name[1/]	Relative Abundance[2/]			
		S	S	F	W
Inca Dove	*Scardafella inca*	u	u	u	u
*Yellow-billed Cuckoo	*Coccyzus americanus*		u		
*Roadrunner	*Geococcyx californianus*	c	c	c	c
*Barn Owl	*Tyto alba*	u	u	u	u
*Screech Owl	*Otus asio*	c	c	c	c
*Great Horned Owl	*Bubo virginianus*	c	c	c	c
*Ferruginous Owl	*Glaucidium brasilianum*	u	u	u	u
Elf Owl	*Micrathene whitneyi*	r	r		
Long-eared Owl	*Asio otus*	r			r
Short-eared Owl	*Asio flammeus*	accidental			
*Poor-will	*Phalaenoptilus nuttallii*	c	o	c	
*Lesser Nighthawk	*Chordeiles acutipennis*	c	c	c	
Vaux's Swift	*Chaetura vauxi*	u		o	
*White-throated Swift	*Aeronautes saxatalis*	u	u	o	u
*Black-chinned Hummingbird	*Archilochus alexandri*	u	u		
*Costa's Hummingbird	*Calypte costae*	c			u
Calliope Hummingbird	*Stellula calliope*	u		u	
Rufous Hummingbird	*Selasphorus rufus*		o	o	
Belted Kingfisher	*Megaceryle alcyon*	u		c	c
*Common Flicker	*Colaptes auratus*	u	o	c	c
*Gila Woodpecker	*Centurus uropygialis*	c	c	c	c
Acorn Woodpecker	*Melanerpes formicivorus*	accidental			
Lewis' Woodpecker	*Asyndesmus lewis*			o	o
Yellow-bellied Sapsucker	*Sphyrapicus varius*	o		u	u
Williamson's Sapsucker	*Sphyrapicus thyroideus*	accidental			
*Ladder-backed Woodpecker	*Dendrocopos scalaris*	c	c	c	c
Tropical Kingbird	*Tyrannus melancholicus*	accidental			
*Western Kingbird	*Tyrannus verticalis*	c	c	o	

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System (Cont.)

Common Name[1/]	Scientific Name[1/]	Relative Abundance[2/] S	S	F	W
Cassin's Kingbird	*Tyrannus vociferans*		r		
*Wied's Crested Flycatcher	*Myiarchus tyrannulus*	o	o		
*Ash-throated Flycatcher	*Myiarchus cinerascens*	c	c	o	o
Eastern Phoebe	*Sayornis phoebe*	accidental			
Black Phoebe	*Sayornis nigricans*	u	c	c	c
Say's Phoebe	*Sayornis saya*	c	u	c	c
Traill's Flycatcher	*Empidonax traillii*	a	o	c	
Hammond's Flycatcher	*Empidonax hammondii*	c		c	
Least Flycatcher	*Empidonax minimus*	r		r	
Gray Flycatcher	*Empidonax wrightii*	o		o	o
Western Flycatcher	*Empidonax difficilis*	c		c	
Western Wood Pewee	*Contopus sordidulus*	c		c	
Olive-sided Flycatcher	*Nuttallornis borealis*	o		o	
*Vermilion Flycatcher	*Pyrocephalus rubinus*	c	c	c	c
Horned Lark	*Eremophila alpestris*			o	o
Violet-green Swallow	*Tachycineta thalassina*	c	o	u	o
Tree Swallow	*Iridoprocne bicolor*	a	u	a	a
Bank Swallow	*Riparia riparia*	o	o		
*Rough-winged Swallow	*Stelgidopteryx ruficollis*	c	c	o	o
Barn Swallow	*Hirundo rustica*	c		c	
*Cliff Swallow	*Petrochelidon pyrrhononota*	c	c	o	
Purple Martin	*Progne subis*	r		r	
Steller's Jay	*Cyanocitta stelleri*	r		r	r
Scrub Jay	*Aphelocoma coerulescens*	r		o	o
Common Raven	*Corvus coras*	c	c	c	c
Common Crow	*Corvus brachyrhynchos*	r		r	u
Pinyon Jay	*Gymnorhinus cyanocephalus*	accidental			
Mountain Chickadee	*Parus gambeli*	r		u	r

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System (Cont.)

Common Name[1/]	Scientific Name[1/]	Relative Abundance[2/]			
		S	S	F	W
Bridled Titmouse	Parus wollweberi	r		u	r
Verdin	Auriparus flaviceps	c	c	c	c
Bushtit	Psaltriparus minimus	accidental			
White-breasted Nuthatch	Sitta carolinensis			r	r
Red-breasted Nuthatch	Sitta caradensis			r	
Brown Creeper	Certhia familiaris			r	r
House Wren	Troglodytes aedon	u		c	c
Bewick's Wren	Thryomanes bewickii			o	o
*Cactus Wren	Campylorhynchus brunneicapillus	u	u	u	u
*Long-billed Marsh Wren	Telmatodytes palustris	u	u	u	u
*Canyon Wren	Catherpes mexicanus	u	u	u	u
*Rock Wren	Salpinctes obsoletus	u	u	c	c
*Mockingbird	Mimus polyglottos	c	c	c	c
Bendere's Thrasher	Toxostoma bendirei	o			
*Curve-billed Thrasher	Toxostoma curvirostre	c	c	c	c
*Crissal Thrasher	Toxostoma dorsale	c	c	c	c
Sage Thrasher	Oreoscoptes mountanus	u		u	o
American Robin	Turdus migratorius	o		u	u
Hermit Thrush	Catharus guttata	u		u	u
Swainson's Thrush	Catharus ustulata	o		o	
Western Bluebird	Sialia mexicana			u	u
Mountain Bluebird	Sialia currucoides			u	u
Townsend's Solitaire	Myadestes townsendi	o		o	o
Blue-gray Gnatcatcher	Polioptila caerulea	o		o	o
*Black-tailed Gnatcatcher	Polioptila melanura	c	c	c	c
Ruby-crowned Kinglet	Regulus calendula	c		c	c
Sprague's Pipet	Anthus sparagueii	accidental			

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System (Cont.)

Common Name[1]	Scientific Name[1]	Relative Abundance[2] S	S	F	W
Cedar Waxwing	*Bombycilla cedrorum*	r		o	
*Phainopepla	*Phainopepla nitens*	c	c	u	c
*Loggerhead Shrike	*Lanius ludovicianus*	c	c	c	c
**Starling	*Sturnus vulgaris*				u
Hutton's Vireo	*Vireo huttoni*	accidental			
Bell's Vireo	*Vireo bellii*	r	r		
Gray Vireo	*Vireo vicinior*	accidental			
Yellow-throated Vireo	*Vireo flavifrons*	accidental			
Solitary Vireo	*Vireo solitarius*	u		u	
Warbling Vireo	*Vireo gilvus*	c	u	c	
Black-and-White Warbler	*Mniotilta varia*			r	r
Blue-winged Warbler	*Vermivora pinus*	accidental			
Orange-crowned Warbler	*Vermivora celata*	c		c	c
Nashville Warbler	*Vermivora ruficapilla*	u		u	
Virginia's Warbler	*Vermivora virginiae*	accidental			
*Lucy's Warbler	*Vermivora luciae*	r	r	r	
Northern Parula	*Parula americana*	r		r	o
Yellow Warbler	*Dendroica petechia*	c	c	c	
Magnolia Warbler	*Dendroica magnolia*	accidental			
Yellow-rumped Warbler	*Dendroica coronata*	c		c	c
Black-throated Gray Warbler	*Dendroica nigrescens*	u		u	
Townsend's Warbler	*Dendroica townsendi*	u		u	
Black-throated Green Warbler	*Dendroica virens*	accidental			
Hermit Warbler	*Dendroica occidentalis*	u		o	
Northern Waterthrush	*Seiurus noveboracensis*	accidental			
MacGillivray's Warbler	*Oporornis tolmiei*	c		c	
*Yellowthroat	*Geothlypis trichas*	c	c	c	u
*Yellow-breasted Chat	*Icteria virens*	c	c	u	

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System (Cont.)

Common Name[1/]	Scientific Name[1/]	Relative Abundance[2/] S	S	F	W
Wilson's Warbler	Wilsonia pusilla	c	c	c	
American Redstart	Setophaga ruticilla	r		o	
**House Sparrow	Passer domesticus	u	u	u	u
Bobolink	Dolichonyx oryzivorus	r		r	o
Western Meadowlark	Sturnella neglecta	u		c	c
*Yellow-headed Blackbird	Xanthocephalus xanthocephalus	c	c	c	
*Red-winged Blackbird	Agelaius phoeniceus	o	o		
*Hooded Oriole	Icterus cucullatus	o	o		
Scott's Oriole	Icterus parisorum	accidental			
*Northern Oriole	Icterus galbula	c	c		
Rusty Blackbird	Euphagus carolinus			r	r
Brewer's Blackbird	Euphagus cyancephalus	u		c	c
Great-tailed Grachle	Cassidix mexicanus	u		u	u
*Brown-headed Cowbird	Molothrus ater	c	c		
*Bronzed Cowbird	Tangavius aeneus	u	u	u	u
Western Tanager	Prianga ludoviciana	c		c	
Hepatic Tanager	Piranga flava	r		r	o
*Summer Tanager	Piranga rubra	o	o	o	
*Cardinal	Cardinalis cardinalis	o	o	o	o
Rose-breasted Grosbeak	Pheucticus ludovicianus	u	o	c	
*Black-headed Grosbeak	Pheucticus melanocphalus	u	o	c	
*Blue Grosbeak	Guiraca caerulea	o	c	o	
Lazuli Bunting	Passerina amoena	u		u	
Varied Bunting	Passerina versicolor	accidental			
Dickcissel	Spiza americana	accidental			
Evening Grosbeak	Hesperiphona vespertina	u		u	r
Purple Finch	Carpodacus purpureus			r	

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System (Cont.)

Common Name[1/]	Scientific Name[1/]	Relative Abundance[2/]			
		S	S	F	W
*House Finch	Carpodacus mexicanus	c	c	c	c
Pine Siskin	Spinus pinus	o		u	u
American Goldfinch	Spinus tristis	o		o	o
*Lesser Goldfinch	Spinus psaltria	u	u	u	u
Lawrence's Goldfinch	Spinus lawrencei	r			o
Red Crossbill	Loxia curvirostra	r		r	o
Green-tailed Towhee	Chlorura chlorura	u		u	u
Rufous-sided Towhee	Pipilo erythrophthalmus	o		u	o
*Brown Towhee	Pipilo fuscus	c	c	c	c
Abert's Towhee	Pipilo aberti	c	c	c	c
Lark Bunting	Calamospiza melanocorys	accidental			
Savannah Sparrow	Passerculus sandwichensis	u		c	u
Grasshopper Sparrow	Ammodramus savannaram	accidental			
Vesper Sparrow	Pooecetes gramineus	u		u	
Lark Sparrow	Chondestes grammacus	o		o	
*Black-throated Sparrow	Amphispiza bilineata	u	u	u	u
Sage Sparrow	Amphispiza belli			u	u
Dark-eyed Junco	Junco Hyemalis	o		u	u
Gray-headed Junco	Junco caniceps			r	
Chipping Sparrow	Spizella passerina	c	o	c	o
Brewer's Sparrow	Spizella breweri	c		c	o
Black-chinned Sparrow	Spizella atrogularis	accidental			
White-crowned Sparrow	Zonotichia leucophrys	c		c	c
Golden-crowned Sparrow	Zonotrichia atricapilla	o		o	r
White-throated Sparrow	Zonotrichia albicollis	o		o	r
Fox Sparrow	Passerella iliaca	r		r	r
Lincoln's Sparrow	Melospiza lincolnii	c		c	o

Table 2 Birds in the Vicinity of the Granite Reef Aqueduct Transmission System (Cont.)

Common Name[1/]	Scientific Name[1/]	Relative Abundance[2/] S	S	F	W
Swamp Sparrow	*Melospiza georgiana*	accidental			
*Song Sparrow	*Melospiza melodia*	c	c	c	c
Chestnut-collared Longspur	*Calcarius ornatus*			r	

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1 Common and scientific names were taken from the Check-list of North American Birds and Supplement published by The American Ornithologists' Union.

2 Relative abundance refers to the abundance of a species relative to other similar species (i.e. hawk relative to hawks).

*Indicates nesting
**Introduced species

E-Listed as Endangered in Fish and Wildlife Service's 1973 edition of Threatened Wildlife of the United States.
T-Listed as Threatened.
SU-Listed as Status Undetermined.

KEY TO RELATIVE ABUNDANCE:

S--March - May
S--June - August
F--September - November
W--December - February

a--abundant
c--common
u--uncommon
o--occasional
r--rare

Table 3 Mammals in the Vicinity of the Granite Reef Aqueduct Transmission System

		Relative Abundance			
		Rare	Uncommon	Common	Very Common
Man	*Homo sapien*				X
Desert Shrew	*Notiosorex crawfordi*			X	
California Leaf-nosed Bat	*Macrotus californicus*			X	
Yuma Myotis	*Myotis yumanensis*			X	
Cave Myotis	*Myotis velifer*				X
California Myotis	*Myotis californicus*			X	
Small-footed Myotis	*Myotis subulatus*		X		
Western Pipistrelle	*Pipistrellus hesperus*			X	
Big Brown Bat	*Eptesicus fuscus*			X	
Red Bat	*Lasiurus borealis*		X		
Hoary Bat	*Lasiurus cinereus*		X		
Lump-nosed Bat	*Plecotus townsendii*	X			
R Spotted Bat	*Euderma maculata*	X			
Pallie Bat	*Antrozous pallidus*			X	
Mexican Free-tailed Bat	*Tadarida brasiliensis*				X
Pocketed Free-tailed Bat	*Tadarida femorosaca*	X			
Big Free-tailed Bat	*Tadarida molossa*	X			
Western Mastiff Bat	*Eumops periotis*	X			
Black-tailed Jack Rabbit	*Lepus californicus*				X
Desert Cottontail	*Sylvilagus audubonii*				X
Rock Squirrel	*Citellus variegatus*			X	
Harris Antelope Squirrel	*Citellus harrisii*			X	
White-tailed Antelope Squirrel	*Citellus leucurus*				X

* Relative abundance means the abundance of the animal in the area the Granite Reef Transmission System will go through relative to other species.

R Listed as rare on the Fish and Wildlife Service's list of Threatened Wildlife of the United States.

Table 3 Mammals in the Vicinity of the Granite Reef Aqueduct Transmission System (cont.)

		Relative Abundance			
		Rare	Uncommon	Common	Very Common
***Horse	*Equus*			X	
***Burro	*Equus asinus*			X	
***Cat	*Felis domestica*			X	
***Cow	*Bos sp.*			X	
***Dog	*Canis familiaris*			X	
***Goat	*Capra hircus*			X	
***Mouse	*Mus musculus*			X	
***Rat	*Rattus norvegicus*			X	
***Sheep	*Ovis aries*			X	
Round-tailed Ground Squirrel	*Spermophilus tereticandus*			X	
Valley Pocket Gopher	*Thomomys bottae*			X	
Longtail Pocket Mouse	*Perognathus formosus*		X		
Little Pocket Mouse	*Peronathus longimembris*		X		
Arizona Pocket Mouse	*Perognathus amplus*			X	
Bailey's Pocket Mouse	*Perognathus baileyi*		X		
Desert Pocket Mouse	*Perognathus penicillatus*		X		
Rock Pocket Mouse	*Perognathus intermedius*		X		
Merriam's Kangaroo Rat	*Dipodomys merriami*			X	
Desert Kangaroo Rat	*Dipodomys deserti*			X	
Southern Grasshopper Mouse	*Onychomys torridus*		X		
Western Harvest Mouse	*Reithrodontomys megalotis*		X		
Canyon Mouse	*Peromyscus orinitus*		X		
Cactus Mouse	*Peromyscus eremicus*		X		
Deer Mouse	*Peromyscus maniculatus*				X
Hispid Cotton Rat	*Sigmodon hispidus*			X	
White-throated Wood Rat	*Neotoma albigula*		X		
Desert Wood Rat	*Neotoma lepida*			X	
Coyote	*Canis latrans*		X		
Kit Fox	*Vulpes macrotis*		X		
Gray Fox	*Urccyon cinereoargenteus*		X		
Ringtail	*Bassariscus astutus*			X	

***Introduced

Table 3 Mammals in the Vicinity of the Granite Reef Aqueduct Transmission System (cont.)

		Relative Abundance			
		Rare	Uncommon	Common	Very Common
Raccoon	*Procyon lotor*		X		
***Opossum	*Didelphis marsupialis*	X			
Badger	*Taxidea taxus*			X	
Spotted Skunk	*Spilogale putorius*		X		
Striped Skunk	*Mephitis mephitis*			X	
Mountain Lion	*Felic concolor*			X	
Bobcat	*Lynx rufus*			X	
Javelina	*Pecari tajacu*		X		
Black-tailed Mule Deer	*Odocoileus hemionus*			X	
Bighorn	*Ovis canadensis*		X		
Pronghorn	*Antilocarpra americana*	X			

***Introduced

Note: Information included in this table was compiled by the Environmental Staff of the Bureau of Reclamation with editorial cooperation and consultation from members of the academic staff at Arizona State University.

Table 4
Trees, Shrubs, and Herbs
in the Vicinity of the Granite Reef Aqueduct Transmission System 1/

(Not including Cacti and Grasses)

Arizona-poppy	*Kallstroemia grandiflora*
Arrow-leaf	*Hofmeisteria pluriseta*
Arrowweed	*Pluchea sericca*
Alfileria, Filaree	*Erodium cicutarium*
Anglepod	*Gonolobus productus*
Allionia, trailing	*Allionia incarnata*
Aster, Mohave	*Aster abatus*
Brickell bush	*Brickellia coulteri*
Broomrape	*Orobanche ludoviciana*
Buffalo-gourd	*Cucurbita foetidissima*
Burrobush, cheeseweed	*Hymenoclea salsola*
Big Saltbush	*Atriplex lentiformis*
Bladder-sage	*Salazaria mexicana*
Bur clover	*Medicago hispida*
Brandegea	*Brandegea Bigelovii*
Burrobrush	*Hymenoclea monogyra*
Bur-sage	*Franseria sp.*
Burrow weed	*Aplopappus tenuiseclus*

1/ This is a listing of the trees, shrubs, and herbs that could be found in the vicinity of the Granite Reef Aqueduct Transmission System. All of these are not expected to be found on the alinement nor is this intended to represent a complete listing of trees, shrubs, and herbs that will be found.

Table 4 (cont.)

Broom baccharis	*Baccharis sarothroides*
Beardtongue, desert	*Penstemon pseudospectabills*
**Bind-weed, field	*Convolvulus arvensis*
Bladderpod	*Lesquerella Gordoni*
Brittle-bush	*Encelia farinosa*
Buffalobur	*Solanum rostratum*
Cottonwood	*Populus Fremontii*
Creosote bush	*Larrea tridentata*
Chinese pusley or quail plant	*Heliotropium curassavicum*
Canaigre	*Rumex hymenosepalus*
Curley leaf dock	*Rumex conglomeratus*
Catclaw-acacia	*Acacia Greggii*
Cream-cups	*Platystemon californicus*
California or Golden poppy	*Eschscholtzia mexicana*
Chuparosa	*Beloperone californica*
Cucumber, wild	*Marab gilensis*
Cocklebur	*Xanthium saccharatum*
Cenizo	*Atriplex canescere*
Chaenactis	*Chaenactis Fremontii*
Coreopsis	*Coreopsis Douglasii*
Coyote-melon	*Cucurbita palmais*

**Introduced species

Table 4 (Cont.)

Crown-beard	Verbesina encelioides
*Crucifixion thorn	Holacantha Emoryi
Clammyweed	Polanisia trachysporma
Clematis, Western Virgin Blower	Clematis Drummondii
Crested prickle poppy	Argemone platyceras
**Daisy, African	
Desert Baileya, Desert Marigold	Baileya multiradiata
Desert Chicory, Goatsbeard	Rafinesquia neomexicana
Desert sunflower	Geraea canescens
*Desertlily	Hesperocallis undulata
*Desert Mariposa	Calochortus Kennedyi
Desert tobacco	Nicotiana trigonophylla
Devilsclaws, Unicornplant	Proboscidea parviflora
Dock	Rumex hymenosepalus
Dodder	Cuscuta indecora
Desert lavendar	Hyptis Emoryi
Dalea	Dalea Fremontii
Dandelion, desert	Malacothryx glabrata
Datura, sacred	Datura metcloides
Desert thornapple	Datura discolor
Desert indian wheat	Plantago Fastigiata
Deer Vetch	Lotus sp.

*Protected plants

**Introduced species

Table 4 (Cont.)

Desert marigold	Baileya multiradiata
Desert-mallow	Sphaeralcea ambigua
Desert star	Monoptilon bellioidas
Desert-willow	Chilopsis linearis
Desert saltbush	Atriplex polycarpa
Dove weed	Croton texensic
Desert hackberry	Celtis pallida
Euphorbia	Euphorbia albomarginata
Escobita	Orthocarpus purpurascens
Evening snow	Linanthus dichotomus
Elephant tree	Bursera microphylla
Enceliopsis, silverleaf	Enceliopsis argophylla
Ephedra, longleaf	Ephedra trifurca
Evening-primrose	Oenothera brevipes or trichocalyx
False mesquite calliandra, fairy duster	Calliandra eriophylla
Fiddleneck	Amsincka intermedia
Fourwing saltbush	Atriplex canescens
Fleabane	Erigeron divergens
Goldfields	Baeria chrysostoma
Goldpoppy, Mexican	Eschscholtzia mexicana

*Protected plants

Table 4 (cont.)

Groundsel	*Senecio monoensis*
Graythorn	*Condalia lycioides*
Grease-wood	*Sarcobatus vermiculatus*
Gilia	*Gilia filiformis*
Globemallow	*Sphueralcea ambigua*
Guajilla	*Calliandra eriophylla*
Helio-trope, salt	*Heliotropium curassavicum*
Heron-bill	*Erodium cicutarium*
Horse-nettle, white	*Solanum elaeagnifolium*
Horehound	*Marrubium vulgare*
Indian wheat	*Plantaginaceae sp.*
Ironwood	*Olneya tesota*
Indian mallow	*Abutilon Pringlei*
Janusia	*Janusia gracilis*
Jimmyweed	*Aplopappus heterophyllus*
Jojoba, Goatnut	*Simmondsia chinensis*
*Joshua-tree	*Yucca brevifolia*
Jimson weed	*Datura stramonium*
Jackass clover	*Wislizenia refracta*
Knap-weed	*Centaurea melitemsis*
Larkspur	*Delphinium scaposum*
Loco	*Astragalus Nuttallianus*

*Protected plants

Table 4 (Cont.)

Lambsquarter	Chenopodium album
Lupine	Lupinus sparsiflorus
Mesquite	Prosopis velutina
Milkvetch	Astragalus sp.
Malacothrix	Malacothryx fendleri
Mallow, cheeseweed	Malva parviflora
Mesquite, honey	Prosopis juliflora
Mesquite, screwbean	Prosopis pubescens
Milkweed	Asclepias sp.
Misteltoe, American & Desert	Phoradendron Californicum
Monkey flower	Mimulus Bigelovii
Mexican Goldpoppy	Exchschottzia mexicana
Mormon-tea	Ephedra trifurca
Narrow leaf saltbush	Atriplex linearis
Nama	Nama demissum
*Ocotillo	Fouquieria splendens
Owl-clover	Orthocarpus purpurascens
Penstemon, Beard tongue	Penstemon pseudospectabilis
Phacelia, Scorpion weed	Phacelia crenulata
Phlox	Phlox tenuifolia

*Protected plants

Table 4 (cont.)

Plantain	Plantago purshii
Poinciana, Bird of Paradise	Caesalpinia Gilliesii
Puncturevine, Burnut, Bullhead	Tribulus terrestris
Paintbrush	Castilleja angustifolia
Prostrate pigweed	Amaranthus graecizan
Phlox, Santa Fe	Phlox nana
Pricklepoppy	Argemone platyceras
Paloverde foothill	Cercidium microphyllum
Paloverde blue	Cercidium floridum
Pasture sagebrush	Artemisia frigida
Petunia	Petunia parviflora
Prickle poppy	Argemone intermedia
Pigmy-weed	Tillaea eracta
Pepper grass	Lepidium Thurderi
Pickleweed, Iodine bush	Allenrolfea occidentalis
Primrose	Oenothera sp.
Prickley lettuce	Lactuca Serriola
**Russian thistle	Salsola pestifer
Rattlesnake weed	Euphorbia albomarginata
Reed, common, Carrizo	Phragmites communis
Rock-nettle	Eucnide urens
Rose mallow	Hibiscus denudatus
Sacred datura, Western & Giant Jinison	Datura meteloides

**Introduced species

Table 4 (Cont.)

Sego-lily	Calochortus nuttallii
Sand-verbena	Abronia villosa
Senna	Cassia covesii
Snake-weed	Gutierrezia lucida
Sowthistle, prickly	Sonchus asper
Spectaclepod	Dithyrea wislizenii
Starflower	Gilia longiflora
Skunkbush	Rhus trilobata
**Saltcedar	Tamarix pentandra
Sour clover	Medicago indicus
Snapdragon	Antirrhinum filipes
Sunflower	Helianthus annuus
Snakes-head	Matacothrix Coulteri
Star thistle	Centaurea Calcitrape
Seepweed	Dondia toxreyana
Seepwillow, water motic	Baccharis glutinosa
Spiderling	Boerhaavia
Spiny aster	Astor spinosus
Shrubby buckwheat	Eriogonum wrightii
Seepweed	Suaeda suffrutescens
Senna	Cassia bauhinioides
Sunray	Enceliopsis argophylla
*Smoke tree, smoke thorn	Dalea spinosa

*Protected plants

**Introduced species

Table 4 (Cont.)

**Tamarisk	Tamarix pentandra
Thistle, New Mexico	Cirsium ucomexicanum
Tobacco, tree	Nicotiana glauca
Triangle bur-sage	Franseria deltoidea
Turpentine bush	Aplopappus laricifolius
Tackstem	Calycoseris wrightii
**Tamarisk	Tamarix aphylla
Telegraph plant, Camphor weed	Heterotheca subaxillaris
Thistle, Mojave	Cirsium neomexicanum
Threadplant	Nemacladus glandul-ferus
Trailing-four-o'clock	Allionia incarnata
White bur-sage	Franseria dumosa
Willow	Salix sp.
White ratany	Krameria grayi
Wolfberry	Lycium macrodon, & Fremontii californicum
*Yucca, soaptree	Yucca elata

*Protected plants

**Introduced species

Table 5

Grasses (Gramineae) in the Vicinity of the Granite Reef Aqueduct Transmission System

Alkali sacaton	Sporobolus airoides
Arizona cottontop	Trichachne californica
Arizona panicum	Panicum arizonicum or hirticaule
Barley grass	Hordeum brachyantherum
Blue grama	Bouteloua gracilis
Big galleta	Hilaria rigida
Bur grass	Tragus Berteronianus
**Bermuda grass	Cynodon dactylon
Blue grama	Boutelous gracilis
Bullgrass	Muhlenbergia Emersleyi
Burrograss	Scleropogon brevifolius
Bigelow bluegrass	Poa Bigelovii
Canarygrass	Phalaris caroliniana
Crabgrass	Digitaria sanguinalis
Cane beardgrass	Andropogon barbinodis
Curly mesquite	Hilaria Belangeri
Fluffgrass	Tridens pulchellus

* This is a listing of some of the grasses that could be found in the vicinity of the Granite Reef Aqueduct Route. All of these plants are not expected to be found growing on the aqueduct alinement nor is this intended to represent a complete listing of grasses that will be found.

**Introduced species

Table 5 (cont.)

Foxtail brome	Bromus rubens
Foxtail barley	Hordeum jubatum
Giant Reed	Arundo Donax
Hairy grama	Bouteloua hirsuta
June grass	Koeleria cristata
Johnson grass	Sorghum halepense
Littleseed muhly	Muhlenbergia microsperma
Lovegrass	Eragrostis diffusa
Needle grama	Bouteloua aristidoides
Perennial ryegrass	Lolium perenne
Plains bristlegrass	Setaria macrostachya
Red sprangletop	Leptochloa filiformis
Rabbit-foot grass	Polypogon monspeliensis
Rothrock grama	Bouteloua Rothrockii
Reed	Phragmites communis
Red brome	Bromus rubens
Rescue brome	Bromus catharticus
Schismus	Schismus barbatus and arabicus
Saltgrass	Distichlis stricta
Spider grass	Aristida ternipes

Table 5(cont.)

Spike bent grass	*Agrostis exorata*
Sixweeks three-awn	*Aristida adsensionis*
Sixweeks grama	*Bouteloua curtipendula*
Sixweeks fescue	*Festuca octoflora*
Slim tridens	*Tridens muticus*
Sideoats grama	*Bouteloua curtipendula*
Slender grama	*Bouteloua filiformis*
Santa Rita three-awn	*Artistida glabrata*
Texas beargrass	*Andropogon cirretus*
Tanglehead	*Heteropogon contortus*
Water grass	*Paspalum dilatatum*
Wild oats	*Avena fatua* or *barbata*

Table 6 Cacti in the Vicinity of the Granite Reef Aqueduct Transmission System

Prickly-Pears

Beaver-tail	*Opuntia basilaris*
Clock-face	*Opuntia chlorotica*
Desert	*Opuntia Engelmannii*
Fragile	*Opuntia fragilis*
Purple	*Opuntia Gosselliana* var. *santa-rita*
Purple-fruited	*Opuntia phaeacantha*

Chollas

Buckhorn	*Opuntia acanthocarpa*
Bush	*Opuntia arbuscula*
Cane	*Opuntia spinosior*
Chain-fruit	*Opuntia fulgida*
Desert Christmas	*Opuntia leptocaulis*
Pencil	*Opuntia ramosissima*
Plateau	*Opuntia whipple*
Silver	*Opuntia echinocarpa*
Stag-horn	*Opuntia versicolor*
Teddy-bear	*Opuntia Bigelovii*

*This is a listing of some of the cacti that could be found in the vicinity of the Granite Reef Aqueduct Transmission System. All of these cacti are not expected to be found on the alinement nor is this intended to represent a complete listing of the cacti to be found.

Table 6 (cont.)

Hedgehogs

Arizona Rainbow	*Echinocereus pectinatus* var. *rigidissimus*
Bonker's	*Echinocereus Bonkerae*
Fendler's	*Echinocereus Fendleri*
Mohave	*Echinocereus mojavensis*
Porcupine	*Echinocereus stramineus*
Robust claret-cup	*Echinocereus gonacanthus*

Barrels (Small, 4-6")

Blue	*Echinocactus horizonthalonius*
Johnson's Pineapple	*Echinomastus Johnsonii*
Chartreuse	*Echinomastus Johnsonii* var. *lutescens*
Pineapple	*Echinomastus acunensis*

Barrels (Large 1-6')

California or Compass	*Ferocactus acanthodes*
Arizona Candy or Fishook	*Ferocactus Wislizeni*
Woolly-headed	*Echinocactus polycephalus*

Cereus

Saguaro-giant	*Carnegiea gigantea*
Night-blooming Cercus	*Peniocercus greggii*

Pincushions

Fishook Pincushion	*Mammillaria microcarpa*
Miller's Pincushion	*Mammillaria milleri*

TABLE 7

INVENTORY OF CULTURAL RESOURCES AFFECTED BY THE GRANITE REEF AQUEDUCT TRANSMISSION SYSTEM

Site	Remarks	Recommendations for Evaluation and Clearance Prior to Construction			
		Photography	Collecting	Test Pitting	No Recommendations
Prehistoric 1/					
Nevada					
Boulder City 1	Thin lithic scatter, metate fragment, trail related	-	-	-	X
Boulder City 2	Thin lithic scatter, trail related	-	-	-	X
Boulder City 3	Related to quarry site Eldorado Mountain No. 1	X	-	-	-
Eldorado Mountains 1	Quarry site	X	-	-	-
Metropolitan Water District 1	Widespread lithic scatter 2/	X	X	X	-
Metropolitan Water District 2	Widespread lithic scatter 2/	X	X	X	-
Metropolitan Water District 3	Widespread lithic scatter, quarry site 2/	X	X	X	-
Metropolitan Water District 4	Widespread lithic scatter 2/	X	X	X	-
Searchlight 1	One lone stone circle, basalt metate	X	-	-	-
Newberry Mountains 2	Three large rock-lined circular depressions	X	-	-	-
Davis Dam and Mohave Plant 1	One disturbed rock feature in a sandy area	X	-	-	-
Arizona					
Bullhead City 1	Chipping station with waste flakes	-	-	-	X
Bullhead City 2	Chipping station	-	-	-	X
Oatman 1	Widespread lithic scatter	X	X	3/	-
Oatman 2	Widespread lithic scatter	X	X	3/	-
Oatman 3	Three circular depressions in desert pavement	X	X	3/	-
Oatman 4	Rock alinement, widespread lithic scatter	X	X	3/	-
Oatman 5	Widespread lithic scatter	X	X	3/	-
Oatman 6	Thin restricted lithic scatter	X	X	3/	-
Oatman 7	Rock alinement, widespread lithic scatter	X	X	3/	-
Oatman 8	Rock alinement, widespread lithic scatter	X	X	3/	-
Oatman 9	Widespread lithic scatter	X	X	3/	-
Basalt Basin 1	Possible rock alinement, widespread lithic scatter	X	X	3/	-
Topock 1	Aboriginal trail, widespread lithic scatter	X	-	-	-
Sacramento Wash 1	Chipping station	X	-	-	
AZ T:10:18	Pottery sherd scatter from a single vessel				
AZ S:2:1	Low density sherd scatter				
Historic					
Nevada					
Searchlight Mining District 1	Area of historical mining claims and related activity	-	-	-	X
Searchlight Mining District 2	Ruins of ore processing mill, associated camps, dumps, and mining claims	-	-	-	X
Searchlight Mining District 3	Historical foundation and dump on edge of historical railroad bed (Crescent RR)	-	-	-	X
Newberry Mountains 1	Historical cache in small blowout	-	-	X	-
Arizona					
Buck Mountains 1	Walled arroyo for placer mining	-	-	-	X
Buck Mountains 2	Historic foundations, dumps, and shafts	-	-	-	4/

1/ Sites with ceramics: The entire right-of-way fits this classification.

2/ Sites related by possible cultural affiliation.

3/ Qualified as "some" for this series.

4/ Careful in locating construction access.

Table 8

ISOLATED ARTIFACTS RECOVERED DURING ARCHEOLOGICAL SURVEY ALONG GRANITE REEF AQUEDUCT TRANSMISSION SYSTEM

No.	Artifact	Reach No.
1	Flakes	1
2	Rhyolite (?) core tool	1
3	Silicate blade fragment	2
4	Glass drinking vessel	2
5	Unmodified quartz crystal	2
6	Quartz flake	2
7	Chert core, flake	2
8	Chert core	2
9	Jasper retouched flake	3
10	Silicate flake	3
11	Basalt (?) core tool, flake	3
12	Basalt (?) core	3
13	Chalcedony flake	3
14	Chalcedony flake	3
15	Granite milling stone fragments	4
16	Granite, schist (?) metate fragment	4
17	Jasper flake	4
18	Granite (?) milling stone fragments	4
19	Granite mano	4
20	Basalt metate fragment	4
21	Silicate flakes, some utilized	4
22	Basalt metate fragment	4
23	Quartz hammerstone	4
24	Quartzite cobble (hammerstone(?))	4
25	Vesicular basalt metate fragment	4
26	Schist (?) pestle (?)	5
27	Granite mano fragment	5
28	Vesicular basalt metate fragment	5
29	Rolled jasper flake (?)	5
30	Quartz flake (?)	5
31	Andesite core	5
32	Flake (?) (artifact absent)	5
33	Rhyolite (?) flake	5
34	Rhyolite flake tool	5
35	Silicate core (?)	5
36	Chalcedony core (tool (?))	5
37	Chalcedony core tool	6
38	Rhyolite flake tool	6
39	Gila (Wingate (?)) shouldered sherd	6
40	Granite mano, metate	7
41	Quartz core tool and debitage	7
42	Sherd scatter #7	8
43	Granite mano fragment, vesicular basalt metate fragment	8
44	Sherd scatter #6	8
45	Sherd scatter #5	9

Table 8
ISOLATED ARTIFACTS RECOVERED DURING ARCHEOLOGICAL SURVEY ALONG GRANITE REEF AQUEDUCT TRANSMISSION SYSTEM
(cont.)

No.	Artifact	Reach No.	No.	Artifact	Reach No.
46	Sherd scatter #3	10	52	Sherd scatter #1	11
47	Sherd scatter #4	10	53	Metate (granite)	11
48	Lithics, sherds, thermal fractured rock	11	54	Sherd scatter #8	11
49	Core tool, proj. pt. base	11	55	Sherd scatter #9	11
50	Lithics, plainware sherds, thermal fractured rock	11	56	Core tool (from Arizona U:5:12 source material)	11
51	Sherd scatter #2	11	57	Proj. pt. frag., core and flake tools	12

APPENDIX D

GLOSSARY OF ENGINEERING TERMS

ANGLE STRUCTURE -

A special structure of various designs to permit changing alinement or direction of the routing of a transmission line.

BAY -

Space in a switchyard or substation used to terminate or connect transmission facilities.

BENCHING -

Local leveling or grading of earth to facilitate design or construction of a structure or operation of equipment.

BUS -

A conductor, or group of conductors, that serve as a common connection for two or more circuits.

CABLE SPREADING YARD -

An installation comprising all necessary facilities to make the transition from overhead high voltage transmission line to underground high voltage insulated cable.

CAPACITY -

The load for which a machine, apparatus, station, or system is rated.

CASCADING -

A progressive failure of a power system or part of a system. Failure or loss of a single critical part such as a large, heavily loaded transformer or transmission line will cause the load to shift to other parts of the system in an attempt to supply the loads. If these parts of the system are then overloaded by this increase, the protective devices will trip, causing these parts to be taken out of service. This progressive loss of transmission capability may cause the entire power system to fail.

CHECK STRUCTURE -

A structure in a canal that regulates water surface elevation upstream of the structure and flow in canal.

CIRCUIT BREAKER -

A mechanical switching device capable of making, carrying, and breaking currents under normal circuit conditions and also for certain abnormal circuit conditions such as those of short circuit.

CIRCULAR MIL -

The cross-sectional area of a circle with a radius of 1 mil (1/1000 of an inch).

CONDUCTOR -

The wire utilized in electrical circuits to carry current.

2-CONDUCTOR BUNDLES -

The common practice of using two wires properly spaced instead of one wire, to reduce electromagnetic effects.

CORONA -

The physical phenomena of exciting the molecules of air (or any gas) surrounding a high voltage conductor. At higher voltage, there is an actual spray of electrons into the atmosphere.

CORRIDOR -

A corridor is a strip of land used in transmission line planning stages which is sufficient in width to provide latitude in locating one or more transmission lines therein, using topography and vegetation, in a manner to achieve the greatest harmony with the natural surroundings and the least impact on the environment.

DEAD END STRUCTURE -

A special structure to permit attachment of each conductor at full line tension as opposed to suspension structures that only support the weight of the conductor. Dead end structures can be used for tangent and angle structures.

DEMAND -

The load at the terminals of an installation or system averaged over a specified interval of time. Example: hourly kilowatt demand.

DISCONNECT SWITCH -

A switch in an electrical circuit that enables an operator to conveniently separate a portion of the installation from the remainder of the circuit.

DISTRIBUTION LINES -

Low-voltage electric powerlines delivering power to final stepdown transformers at voltages from 2 to 34.5 kV.

DISTRIBUTION SYSTEM -

That portion of an electric system used to deliver electric energy from points on the transmission or bulk power system to the consumers.

DOUBLE CIRCUIT -

Two separate 3-wire power circuits on the same tower.

ELECTRIC POWER -

A term used in the electric power industry to mean inclusively power and energy.

EMERGENCY INTERCONNECTION -

An interconnection established to meet an emergency need.

ENERGY -

That which does or is capable of doing work. It is measured in terms of the work it is capable of doing; electric energy is usually measured in kilowatthours.

FAULT -

A malfunctioning of a transmission line usually due to the short-circuiting of two conductors or live (energized) conductors contacting ground.

FOSSIL-FUEL PLANT -

An electric powerplant utilizing fossil fuel, coal, lignite, oil, or natural gas, as its source of energy.

GENERATION -

The act or process of producing electric energy from other forms of energy; also the amount of electric energy so produced.

INSTALLED CAPACITY -

The total of the capacities as shown by the nameplates of similar kinds of apparatus such as generating units, turbines, synchronous condensers, transformers, or other equipment in a station or system.

INSULATING OIL -

A special oil, usually refined from petroleum, used to provide electrical insulation and heat transfer in many types of electrical equipment.

INTERCONNECTION -

A tie permitting a flow of energy between the facilities of two electric systems.

INTERTIE -

Same as Interconnection.

kV (kilovolt) -

The term for thousand volts.

kWh (kilowatthour) -

The term for thousand-watt-hours (electrical energy).

LIGHTNING ARRESTER(s) -

A device installed on power systems to protect equipment from damaging currents resulting from lightning strike.

LINE LOSS -

Energy loss and power loss on a transmission or distribution line.

LOAD -

This is used in a number of ways: to indicate a device or collection of devices which consume electricity; to indicate the power required from a given supply circuit; the power or current being passed through a line or machine.

MW (megawatt) -

One million watts.

NESC -

The abbreviation of the National Electrical Safety Code.

NETWORK -

A system of transmission or distribution lines so cross-connected and operated as to permit multiple power supply to any principal point on it.

OFFPEAK ENERGY -

Electric energy supplied during periods of relatively low system demands as specified by the supplier.

OFFPEAK POWER -

Power supplied during designated periods of relatively low system demands.

OVERHEAD GROUND WIRES -

Conductors erected along the top of towers and poles to protect insulators and conductors from lightning damage. Sometimes called static or shield wires.

PEAK LOAD -

The maximum load consumed or produced by a unit or group of units in a stated period of time. It may be the instantaneous load or the maximum average load over a designated interval of time.

PHASE SHIFTING TRANSFORMER -

A device which can control the power flow as desired, on a line operated in parallel with other lines.

PHASE TO GROUND -

The difference in electrical potential between an energized conductor of a multiphase power system and the earth.

PHASE-TO-PHASE -

The difference in electrical potential between any two energized conductors in a multiphase power system.

POTHEAD -

A device that seals the end of an insulated cable and provides insulated egress for the conductor or conductors.

POWER RESOURCES -

Installation capable of converting hydro or thermal energy into electric power.

PUMP DROPPING -

The curtailing of electric power load in the form of removing electric pumps from the electric system at the supplier's discretion, or in accordance with a contractual agreement.

RADIAL TRANSMISSION LINES -

A transmission line supplying electric energy to a substation or a load that receives energy by no other means. The normal flow of energy in such a transmission line is in one direction only.

RELIABILITY -

Measure of an electric power system's ability to provide a continuous uninterrupted flow of power.

RIGHT-OF-WAY -

A legal right to use a strip of land belonging to others for construction and operation of a transmission line. This right restricts the use of the land to uses that are compatible with the transmission line. In some areas, additional right-of-way would be acquired for operation and maintenance roads.

SERIES CAPACITORS -

Devices inserted in a transmission line which make it possible to carry more load without instability than would be the case without them, usually used on long, extra-high-voltage lines.

SERVICE AREA -

Territory in which a utility system is required or has the right to supply or make available electric service to ultimate consumers.

SHOOFLY -

A temporary transmission line constructed to provide electrical service during the reconstruction or repair of a permanent facility.

SPINNING RESERVE -

Generating capacity connected to the bus and ready to take load.

STRUCTURE -

A means of supporting the conductor. A structure may be made of many types of material and constructed in various shapes.

SUBSTATION -

A single facility at which connections between the various components of a system, such as lines and transformers, are made and the switching of these components is carried out. A typical example is Liberty Substation.

SUSPENSION STRUCTURE -

A tower supporting conductors on vertical suspension insulators so that the tower carries only wind and vertical loads.

SWITCHING STATION -

See "Substation." Los Angeles Department of Water and Power describes their facility as "McCullough Switching Station."

SWITCHYARD -

A facility that is part of a larger feature such as a pumping plant or powerplant at which connections between the various components of a system are made and the switching of these components is carried out. A typical example is Parker Dam 230-kV switchyard.

TEMPORARY SERVICE -

Electric service to a load which exists for a relatively short time. Examples of temporary services are those supplying construction power, carnivals, and street decorations for celebrations.

TRANSFORMER -

An electrical device which changes electric energy from one voltage to another at the same frequency.

TRANSMISSION LINE -

A facility for transmitting electrical energy at high voltage from one point to another point. Transmission line voltages are normally 115-kV or larger.

TRANSMISSION LINE CAPACITY -

The maximum continuous rating of a transmission line. The rating may be limited by thermal considerations, capacity of associated equipment, voltage regulation, system stability or other factors.

TRANSMISSION SYSTEM -

An interconnected group of electric transmission lines and associated equipment for the movement or transfer of electric energy in bulk between points of supply and points at which it is transformed for delivery to ultimate consumers, or is delivered to electric systems of others.

UTILITY LINES -

Low voltage, usually 69-kV or less, electric powerlines, telephone lines, or other like facilities.

WATT -

The unit of power in the International System of Units; equivalent to 1/746 of a horsepower.

WATT-HOUR -

Unit of electrical energy, or work, equal to one watt acting for one hour.

WHEELING POWER -

The transfer of power through a system without use.

WHEELING SERVICE -

An electric operation wherein transmission facilities of one system are utilized to transmit power of another system. Wheeling service may be accomplished by displacement.

GLOSSARY OF ENVIRONMENTAL TERMS

AVIFAUNA -

All birds of a given region.

BIOME -

A complex community of all living organisms, e.g., tundra biome, grassland biome, desert biome.

BIOTA -

All fauna and flora of a given region.

BOSQUE -

A grove or community of trees in a given area.

CARNIVORE -

An organism which acquires life-sustaining nutrients by utilizing living organisms as food.

CARRYING CAPACITY -

The number of animals that can be maintained in a given habitat.

CREPUSCULAR -

Animals that appear or become active at twilight or just before sunrise.

DIURNAL -

Occurring every day, generally in daylight.

ECOLOGY -

That branch of the biological sciences which deals with relationship between living organisms and their surrounding habitat.

ECOSYSTEM -

A complex system composed of a community of fauna and flora taking into account the chemical and physical environment with which the system is interrelated.

EXOTIC SPECIES -

Introduced species. Not indigenous to a given area.

FAMILY -

In taxonomy, a category containing one or more genera which have similar characteristics.

FAUNA -

All animal life associated with a given habitat, country, area, or period.

FERAL -

An organism which has escaped from cultivation or domestication and exists in the wild.

FLORA -

All plantlife associated with a given habitat, country, or period. Bacteria are considered flora.

FLYWAY -

The migration route of birds.

FORB -

Any herb other than grass.

GENUS -

In taxonomy, a group of closely related species comprised of common distinguishing characteristics.

HABITAT -

An area where a plant or animal lives. (Sum total of environmental conditions in the area.)

HERBIVORE -

An organism which acquires life-sustaining nutrients by feeding on vegetation.

INVERTEBRATE -

Literally, all animals without a vertebral column.

NICHE -

The place or status of an organism in its environment, i.e., the niche of a lake trout is the deep portion of a lake.

NOCTURNAL -

Animals that are active at night.

PHREATOPHYTE -

A plant that habitually obtains its water supply from the zone of saturation, either directly or through the capillary fringe.

PLAYAS -

Drainage basins with no outlet usually high in salinity and alkalinity.

PREDATOR -

Gaining nutrients by capturing and feeding upon other animals.

PREY -

An animal hunted or killed and used as a food source by another animal.

RAPTOR -

A predatory bird that catches its prey by using its talons (i.e., hawks and owls)

SPECIES -

In taxonomy, a subdivision of a genus which (1) has a high degree of similarity, (2) is capable of interbreeding only among themselves, and (3) shows persistent differences from members of allied species.

STATUS UNDETERMINED -

A species or subspecies which has been suggested for threatened or endangered classification, but about which further information is needed to clarify its status.

TAXONOMY -

The science of classification according to relationships of organisms.

THREATENED SPECIES -

Any species which has the potential of becoming endangered in the near future.

TURBIDITY -

A measure of the extent to which light passing through water is reduced due to suspended materials. Excessive turbidity may interfer with light penetration and minimize photosynthesis, thereby causing a decrease in primary productivity. It may interfer directly with essential physiological functions of fish and other aquatic organisms, making it difficult for fish to locate a food source, and alter water temperature.

VERTEBRATE -

Animals which have backbones or vertebral columns.

XEROPHYTE -

Plants which are structurally adapted to growing in dry or desert conditions. The plants often have a greatly reduced leaf surface area to prevent water loss, thick, fleshy parts for water storage, and many possess hairs, spines, or thorns.
Examples: cacti, Joshua tree, yucca.

APPENDIX E

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